3. AFFECTED ENVIRONMENT AND POTENTIAL EFFECTS

The existing environment affected by the proposed actions and the potential environmental consequences of each alternative action are described in this chapter.

3.1 Visual Resources

3.1.1 Affected Environment

Tellico Reservoir, newest of the Tennessee Valley reservoirs, offers a somewhat unique visual character and scenic resource. While the ten navigable main channel reservoirs tend to lie parallel with the Valley, the Tellico impoundment enters the mainstream in a perpendicular fashion. This creates a variety in visual character ranging from gently rolling valley topography, to the mountain clear-stream entrance that the Little Tennessee makes below Chilhowee Dam. The Tellico River joins the reservoir in a similar fashion, as it emerges from the Appalachian foothills. The terrain of the area was a mix of open, rolling farmland combined with an expanse of tilled, river-bottom cropland, intermingled with wooded foothills, ridges, and fence rows prior to impoundment. The resulting landscape following the reservoir's impoundment in 1979 was similar, but with the river bottom cropland being replaced with a lake expanse.

Only the upper reaches of the Little Tennessee and the Tellico Rivers still reflect their pre-impoundment visual character. The balance of the reservoir land has a mix of new homes, industrial development, new highways, and an ever-growing, lake-oriented recreational use. However, in spite of the changes that have occurred since impoundment, the dominance of the valley-to-mountain setting that is the characteristic valued, scenic resource is still evident.

The creation of Tellico Reservoir has enhanced scenic viewing opportunities for homeowners, highway travelers, and recreationists. Land set aside through previous reservoir planning efforts and subsequent plan modifications (e.g., Rarity Bay) made available homesites in planned communities that take advantage of shoreline and backlying, lake view building sites. These controlled development efforts have resulted in visually acceptable subdivisions where uniform colors and building materials for the most part blend with the surroundings. While these homesites with their associated docking and lake use facilities are a visual departure from the previous landscape, their adherence to planned development has made them more visually acceptable. It is commonplace to see boaters idling along the shoreline admiring these lakefront homesites. Some scenic value exists for the shoreline viewer in viewing a passing boat or watching a fisherman sit quietly in an adjacent cove. However at times boat traffic, personal watercraft operation, or a bass tournament "blast off" may greatly decrease the scenic/aesthetic values associated with the reservoir.

Industrial development currently exists in the midportion of the reservoir near the Highway 411 crossing and the town of Vonore. Most of this development is light industry and lies within planned industrial parks. Rail service exists in the area and a railroad bridge is visible just downstream of the Highway 411 bridge. Some of the boat manufacturing plants which are shoreline based have taken care to blend their facilities in ways that make them more visually appealing to the lake user.

Just upstream of Highway 411 are the British Fort Loudoun and the Tellico Blockhouse restorations which make up the Fort Loudoun State Historic Area. The Sequoyah Museum, owned by the Eastern Band of the Cherokee Indians, is also located in this area. The portion of Highway 411 that crosses the reservoir at this point and Highway 321 that connects Maryville to Lenoir City have the state's Scenic Parkway designation. A short distance upstream of the state park, the reservoir narrows, and the viewer experiences passing from the openness of the Toqua area into the foothills and backlying mountains of the Cherokee National Forest. Water temperature drops noticeably at this point, the shoreline is less developed, and the viewer can enjoy the scenic resources of the Tellico Reservoir Wildlife Management Area. Only a few residences can be seen along this reach of the reservoir where it quickly returns to a clear, riverine character ending abruptly at Tallahassee and the Chilhowee Dam.

Areas of the reservoir which hold the greatest scenic value are those not yet developed, those that are a homeowner's predominant view, and the distinctive features in the landscape that are seen by the lake user and adjacent highway traveler. Undeveloped coves which allow the boater an anchorage in calm water, scenic bluffs and steep shoreline exhibiting rock outcroppings, and unusual vegetative growth are held by the public as the most valuable of the reservoir's scenic resources. Twenty-nine miles of shoreline (as described under Alternative A below), have excellent and distinctive visual qualities.

3.1.2 Environmental Consequences

This section discusses the potential effects the two alternatives would have on the visual resources (scenic/aesthetics) associated with the Tellico Reservoir land tracts.

Alternative A – The 1982 land use plan does not have a designation for scenic/aesthetic protection of TVA-held tracts. During recent field studies, seven parcels (24, 26, 48, 72, 99, 117, and 128) ranging in size from 3 acres to 645 acres and consuming 29.7 miles of shoreline were rated as having excellent and distinctive visual qualities. Under Alternative A, this land is currently allocated for Cultural/Public Use/Open Space Areas, Private Residential, and Natural/Wildlife Areas. If this alternative remains in place, there would continue to be no established plan that would allocate certain public lands for visual resource management. A general cumulative decline in undeveloped scenic/aesthetic resource would be expected as residential and commercial

development increases with the population in areas such as Rarity Bay, Foothills Pointe, and Tellico Village. Under Alternative A, no previously established visual buffers had been designated to help maintain the visual integrity of the remaining natural shoreline until the Shoreline Management Initiative (SMI) (TVA, 1998a) was formulated for all future residential development; however, as noted above, newer developments such as Rarity Bay have incorporated shoreline buffers and other visual protection measures, and developments such as Tellico Village have been designed to be aesthetically pleasing.

In addition, TVA considers visual impacts when selling private recreational easements for lands fronting lots in existing subdivisions, and the environmental evaluation that TVA performs prior to development of TVA lands or prior to issuance of Section 26a permits for developments on private lands addresses resultant visual impacts. This process may prevent some losses in visual quality or may enact mitigative measures that reduce scenic impacts. Under this alternative, development proposals are considered where appropriate, as long as they are consistent with the existing plan.

Alternative B – Adoption of this alternative would take into account the public's desires to protect scenic/aesthetic resources around Tellico Reservoir for the long term. This alternative generally has a beneficial effect on the visual resource. During the development of the proposed Plan, an analysis was conducted of each plannable tract of land on Tellico Reservoir. Land with distinctive visual characteristics and which possesses outstanding scenic qualities would be placed in the Sensitive Resource Management Zone or the Natural Resource Conservation Zone (Zones 3 and 4). Activities such as recreational hiking, picnicking, bank fishing, and some forest-management activities can take place under these designations. Also, some developmental change can also take place under these designations, as long as its placement and appearance are subordinate to the general visual characteristic.

The seven parcels previously noted in the discussion of Alternative A were rated in the allocation process as having excellent and distinctive visual qualities and would be allocated to the Sensitive Resource Management Zone. (Thirteen parcels would be allocated to the Natural Resource Conservation Zone [Zone 4].) These 20 parcels have 72.4 miles of shoreline and a total of 3063 acres or 24 percent of the total TVA land base on Tellico Reservoir.

Designation of a "River Corridor" or "Greenway" serves as a two-fold preserver of visual/aesthetic qualities. A Greenway sets aside a visual buffer as seen by the lake user in addition to providing a lake viewing corridor for the hiker and cyclist. The parcels of shoreline property being set aside for this purpose will preserve a number of small coves along the right bank of the reservoir that have traditionally been used as quiet anchorages by the boater. A Greenway Corridor along this shore will also provide middle and background views to the numerous residents living in Tellico Village on the opposite reservoir shore. Designation of the

38-acre parcel along Highway 411 for recreational uses would allow the Eastern Band of the Cherokee Indians to develop facilities that would increase the public's contact and viewing opportunities with Tellico Reservoir. While development of this narrow band of highway frontage will be highly visible to both highway travelers and lake users, it should increase awareness of and visitation to other cultural attractions in the area (Fort Loudoun, Sequoyah Museum, and the Block House). If care is given during design phases of these potential facilities, a blending of scenic values and aesthetics can be incorporated into a visually-acceptable development.

Under Alternative B, the cumulative impacts to visual resources would be less than Alternative A. The allocation of key visual parcels on the marginal strip to Zone 3 under Alternative B would offer important protection to the shoreline's visual quality when viewed from ongoing residential developments such as Rarity Bay and Foothills Pointe. Visual protection measures are incorporated into newer residential developments such as Rarity Bay. TVA will consider visual impacts when selling recreational easements to lot owners in other existing subdivisions. Further protection from cumulative impacts resulting from development pressures on Tellico Reservoir's scenic resources would be offered by the extensive shoreline protection proposed for the Little Tennessee River upstream of Toqua.

3.2 Cultural Resources

3.2.1 Existing Environment

For at least 12,000 years, the Tennessee River and the Little Tennessee River Valley have been an area for human occupation which became more intense through succeeding cultural periods. In the upper east Tennessee area, archaeological investigations have demonstrated that Tennessee and the eastern Ridge and Valley Region were the setting for each one of these cultural/temporal traditions, from the Paleo-Indian (12,000-8000 B.C.), the Archaic (8000-1200 B.C.), the Woodland (1200 B.C.-1000 A.D.), the Mississippian (1000-1500 A.D.), to the Protohistoric-Contact Period (1500-1750 A.D.). Prehistoric archaeological stages are based on changing settlement and land use patterns and artifact styles. Each of these broad periods is generally broken into subperiods (Early, Middle, and Late), which are also based on artifact styles and settlement patterns. Smaller time periods, known as "Phases" are represented by distinctive sets of artifactual remains. In addition, historic era cultural traditions have included the Cherokee (1700 A.D.-present), European- and African-American (1750 A.D.-present) occupations.

The Paleo-Indian Period (12,000-8000 B.C.) represents the documented first human occupation of the area. The settlement and land use pattern of this period were dominated by highly mobile bands of hunters and gatherers. The subsequent Archaic Period (8000-1200 B.C.) represents a continuation of the hunter-gatherer lifestyle. Through time, there is increasing social complexity and the appearance

of horticulture late in the period. The settlement pattern during this period is characterized by spring and summer campsites. Increased social complexity, reliance on horticulture and agriculture, and the introduction of ceramic technology characterize the Woodland Period (1200 B.C.-1000 A.D.). The increased importance of horticulture is associated with a less mobile lifestyle as suggested by semipermanent structures. The Mississippian Period (1000-1500 A.D.), the last prehistoric period in east Tennessee, is associated with the pinnacle of social complexity in the southeastern United States. This period is characterized by permanent settlements, maize agriculture and chiefdom level societies.

The Archaic through Mississippian Periods have been intensively investigated along the Little Tennessee River Valley (Chapman 1973, 1975, 1977, 1978, 1979a, 1979b, 1981; Cridlebaugh, 1981; Kimball, 1985; Polhemus, 1987; Davis, 1990; Guthe and Bistline, 1981). In addition, it is widely known historically that many settlements along the Little Tennessee River were Overhill Cherokee villages (Timberlake, 1927; Bartram, 1995). Many archaeological investigations in the 1960s and 1970s focused on the Cherokee occupation of the area (Schroedl, 1985; Baden, 1983; Russ and Chapman, 1984). Also studies of the trade relation between European-American and Cherokee have been conducted in the Tellico Reservoir (Polhemus, 1979). All of these investigations have provided additional details about the changing environments, shifting subsistence strategies and settlement patterns, and variations in the cultural material associated with each major stage.

TVA is mandated under the National Historic Preservation Act (NHPA) of 1966 and the Archaeological Resources Protection Act (ARPA) of 1979 to protect significant archaeological resources and historic properties located on TVA lands or affected by TVA undertakings. A historic property is defined under 36CFR§800.16 (l) as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places” (NRHP).

In response to this federal legislation, TVA conducts inventories of its lands to identify historic properties. For the action proposed in this EIS, the Area of Potential Effect (APE) is the 12,643 acres of retained TVA lands being planned or previously committed to specific land uses. The APE as defined in 36 CFR §800.16(d) is “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist.” Recently, TVA contracted with the University of Tennessee to conduct a Phase I Cultural Resources Survey of approximately 2,541 acres of TVA land being planned and located above summer operating range (elevation 812-813) on Tellico Reservoir. The parcels were initially identified for surveying based on the potential for development of these lands. Following additional investigations of sensitive resources on these lands, several parcels were proposed for Zones 3 and 4.

The survey was conducted by means of a pedestrian survey and systematic shovel testing from existing humus to culturally sterile subsoil. The soil matrix was screened through a one-fourth inch wire mesh screen. Crew members walked the areas in 20-meter transects and excavated shovel tests pits on 20-meter centers along each transect in zones of low slope and/or high site probability.

Existing data along with the recent survey results were reviewed, and over 750 archaeological resources have been identified within and along the Tellico Reservoir. An archaeological resource is defined as an area with any grouping of five or more nonmodern historic or prehistoric artifacts. A large number of these resources have been inundated due to reservoir impoundment. A total of 410 archaeological resources were identified in the area being planned. About 53 of these archaeological resources were recommended to be ineligible for listing in the NRHP; 323 were recommended to be potentially eligible for listing; and 34 were recommended to be eligible for listing. Further investigations of archaeological resources would be necessary to determine whether other resources are eligible for listing in the NRHP. About 10,102 acres were not fully investigated during the preparation of the Plan and EIS or during previous surveys. These parcels were not fully investigated because no development was proposed or parcels had a low probability of containing archaeological resources because of the site characteristics. Archeological resources were also identified on 17 miles of the 62.4 miles of residential access shoreline. In addition, the Lower Jackson Bend land tract recently conveyed by TRDA for commercial recreation development was surveyed for archaeological resources. No archaeological resources eligible or potentially eligible for listing on the NRHP were identified on the Lower Jackson Bend tract. However, a Mid-19th century cemetery, Wyly Cemetery, was identified within the tract. Only two of the fifty marked graves have discernible headstones- James and Mary Wyly. James Wyly was a Revolutionary War veteran who served from 1779-1781. The Wyly Cemetery was recommended for avoidance.

3.2.2 Environmental Consequences

Under either described alternative in this EIS and Plan, TVA would use the Phased Identification and Evaluation Procedure set forth in 36 CFR §800.4(b)(2), regulations of the Advisory Council on Historic Preservation implementing Section 106 of National Historic Preservation Act, in order to identify, evaluate, and assess effects on historic properties, and to determine the appropriate course of action prior to an Undertaking. An Undertaking is defined under 36 CFR §800.16(y) as "a project, activity or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; those requiring a Federal permit, license or approval; and those subject to state or local regulation administered pursuant to delegation or approval by a Federal agency." The results of archaeological testing on Tellico Reservoir would be consulted prior to undertaking site-specific activities under either alternative. TVA would continue the present process of case-by-case review in TVA-

controlled areas potentially subject to ground-disturbing actions such as dredging, shoreline development, or timber harvesting through Phased Identification and Evaluation of Historic Properties. Archaeological resources within these areas are avoided whenever possible. If avoidance is not possible, then proper procedures will be implemented in the mitigation of the historic property. TVA will take necessary steps to ensure compliance with regulatory requirements of NHPA and ARPA.

Under both alternatives, TVA has categorized the 62 miles of residential shoreline to protect sensitive resources, including historic properties. Archaeological resources were identified on about 17 miles of this shoreline. The predominant part of this shoreline is in Zone 3 or the Residential Mitigation category of Zone 7. Under either alternative, the cumulative impacts to archaeological resources would be insignificant.

Alternative A –There are a number of archaeological resources that are considered eligible or potentially eligible for listing in the NRHP on Tellico Reservoir lands. Table 3.2.2-1 shows the distribution of known archaeological resources in relation to the land uses under Alternative A. This table only includes TVA-retained land. Under this action, site-specific activities proposed in the future would be approved, mitigated, or denied according to the significance of the resource. If mitigation is required, appropriate archaeological investigation will be necessary, and potentially impacted resources will be properly recorded and removed. This plan does not provide for specific preservation of archaeological resources. However, TVA will comply with regulatory requirements of NHPA and the ARPA.

Table 3.2.2-1. Archaeological Resources Recorded Within TVA's Alternative A Land Use Categories

Category	Acreage	Number of Recorded Archaeological Resources
TVA Dam Reservation	665.9	5
Cultural/Public Use/Open Space Areas	7,679.9	157
Natural/Wildlife Areas	1,912.3	117
Industrial Development Areas	367.0	17
Recreation Areas	1,428.4	29
Private Residential Areas	423.6	82
Highway	56.1	1
Eastern Band of the Cherokee Indians Memorial Site	109.6	2
Total	12,642.8	410

Alternative B – Early identification of the presence of cultural resources through placement in Zones 3 and 4 avoids the likelihood of soil-disturbing activities in

areas known to contain historic properties. This would, in turn, save time and reduce costs and ensure greater protection than under Alternative A. All soil-disturbing activities that occur on parcels which contain historic properties would be reviewed and necessary steps taken to ensure compliance with regulatory requirements of NHPA and the ARPA.

The investigations at Tellico Reservoir identified a total of 410 archaeological resources on 87 of the parcels (Table 3.2.2-2). Under Alternative B, lands containing 62 percent of the identified archaeological resources would be allocated to Zones 3 (Sensitive Resource Management) and 4 (Natural Resource Conservation). Zones 3 and 4 would effectively preserve the resources. Further investigations will be required if the resources cannot be avoided. The remaining 38 percent of the archaeological resources are in Zone 2 (Project Operations), Zone 5 (Industrial/Commercial), Zone 6 (Recreation) and Zone 7 (Residential Access). At least 357 of these archaeological resources have been recommended to be either potentially eligible or eligible for listing in the NRHP. Although only 20 percent of the land proposed in Alternative B has been surveyed for archaeological resources, 53 percent of proposed development land under Zones 5 and 7 has been investigated. These zones would have the most potential for development, and the identification of archaeological resources within Zones 5 and 7 would enable development to avoid the resources effectively. If the resources could not be avoided, then further investigations would be required to determine the resources' eligibility for inclusion in the NRHP. Thus, under Alternative B, the archaeological resources would be protected at two levels; first, the resources in Zones 3 and 4 would be preserved since there would be no commercial, industrial, or residential development in these zones; and second, any ground-disturbing activity would be subject to compliance under Section 106 of the NHPA.

Table 3.2.2-2 Archaeological Resources Recorded Within Alternative B Land Use Zones

Zone	Acreage	Acreage Surveyed	Number (#) of Recorded Archaeological Resources	% of Zone Surveyed	# of Parcels	# of Parcels Containing Archaeological Resources
2	635.1	0*	6	0.0%	3	2
3	2,184.5	888.5	85	41.7%	28	24
4	7,136.5	1,087.5	173	15.2%	41	28
5	331.4	34.8	14	10.5%	8	4
6	1,803.5	88.0	40	4.9%	33	11
7	551.8	442.0	92	80.1%	27	18
Total	12,642.8	2,540.8	410	20.1%	139	87

* *No recent formal cultural resource survey, funded by TVA, has been conducted in this zone that would conform to Tennessee State Historic Preservation Officer (SHPO) Standards and Guidelines for Archaeological Resource Management Studies (1999).*

TVA and the Tennessee State Historic Preservation Officer (SHPO) have executed a Memorandum of Agreement (MOA, see Appendix C-1) specifying measures relating to the identification, evaluation, and treatment of historic properties that TVA will carry out prior to the commencement of any ground-disturbing activities. In addition, adjoining landowners with a demonstrated interest in a specific ground-disturbing activity due to the nature of their legal or economic relation to a particular undertaking will be invited to be consulting parties. The MOA allows phased identification, evaluation, and treatment of the historic properties located within the APE. TVA will conduct surveys to identify all previously unrecorded historic properties within the APE. TVA will then evaluate the historic significance of properties identified through the survey in accordance with 36 CFR § 800.4(c). For properties that have been determined to be potentially eligible for the NRHP, TVA will perform a Phase II site evaluation. TVA will ensure that historic properties determined eligible for listing in the NRHP will be avoided whenever prudent and feasible by any activities that could affect the characteristics of a site that qualify it for listing in the NRHP. When adverse effects through physical destruction or damage to historic properties eligible for the NRHP under Criterion (d) of 36 CFR § 60.4 is unavoidable, data recovery will be implemented.

3.3 Threatened and Endangered Species

3.3.1 Affected Environment

3.3.1.1 Plants

In researching plant communities on Tellico Reservoir, TVA Regional Natural Heritage Program databases and other sources were used to compile a list of state- and/or federally-listed species known to occur or to have suitable habitat on Tellico lands planning parcels. Field inventories were conducted on all uncommitted land (that is, land without existing commitments).

No populations of federally-listed plant species are known to exist on any TVA land on Tellico Reservoir. The nearest known such population is approximately 4.5 miles to the east of the reservoir in the Great Smoky Mountains National Park. One species listed as endangered in Tennessee is thought to be present, but a positive identification has yet to be made. One species listed as threatened in Tennessee and two species listed as special concern (one commercially exploited) in Tennessee have been located. Table 3.3.1.1-1 lists these species and their status, as well as three species that have been found on Tellico Reservoir in the past but were not found during the course of this survey.

> Bur-reed: Ten to 15 clumps of a *Sparganium* species were found during the survey of the Tellico Lands Planning Parcel 26. This small tract contains an open, herbaceous wetland that is drained by a small stream. Two species of *Sparganium* have been documented from Tennessee:

Sparganium americanum, which is reasonably common in east Tennessee, and *S. androcladum*, a northern species, which has only been collected twice in the state and which is state-listed as endangered. The leaves of the Tellico plants are distinctly triangular in cross-section, a characteristic of *S. androcladum* rather than *S. americanum*. There were no flowering stems present, however, and a definitive identification could not be reached.

False foxglove: This is a parasitic, late summer-flowering member of the foxglove family. This species is a rather coarse, clump-forming perennial with large yellow flowers, opposite leaves, and long stems. It grows on steep, dry, partially-shaded calcareous slopes above large streams and rivers, and is usually found within a few meters of the water.

A population of false foxglove was found at the entrance of the cove in Parcel 4. The plants are growing at the base of the steep west-facing bluffs, a few meters from the water's edge, along the main channel of the reservoir. Approximately 100-200 clumps were found on the north side of the cove (Parcel 3) and approximately 50 on the south side (Parcel 4). The steep slopes provide protection and a natural buffer to this site, reducing the possibility of impacts as a result of development elsewhere on these two parcels.

Carey's saxifrage: This spring-flowering species is a low, clump-forming plant with toothed leaves and an open cluster of small white flowers. It grows on moist, forested limestone cliffs and steep, rocky slopes. Several individuals of this species were found along the northwest edge of the Tellico Dam Reservation in a high-quality, mesic-limestone bluff community.

Goldenseal: This perennial herb is related to the buttercup and has large, yellowish, five-lobed leaves and bright red fruits. It grows in moist to dry forests with rich, limestone-derived soil. Three individuals were located on a single parcel. This species is listed as special concern-commercially exploited in Tennessee because of the heavy demand for its roots as a folk medicine.

Bigleaf pondweed: This member of the pondweed family is typically found in ponds, lakes, and slow-moving water. It is characterized by elliptical floating leaves and lance-shaped, submerged leaves. Flowers are often underwater and, therefore, frequently go unnoticed. This species had previously been found in the main channel of the Little Tennessee River and may still occur in the upstream, more riverine sections of the reservoir.

Tennessee pondweed: This member of the pondweed family occurs in streams and rivers. Tennessee pondweed is characterized by very narrow (0.2-2 mm) submerged leaves. It had previously been found in the main channel of the Little Tennessee River and may still occur in the upstream, more riverine sections of the reservoir.

Pondweed: This member of the pondweed family is typically found in still or moving water of pools, lakes, and streams. This plant has two types of leaves: floating leaves that are wide and egg-shaped and submerged leaves that are narrow and strap-shaped. It had previously been found in the main channel of the Little Tennessee River and may still occur in the upstream, more riverine sections of the reservoir.

Table 3.3.1.1-1 Listed Plant Species Known From or Potentially Occurring Adjacent to Tellico Reservoir

Common Name	Scientific Name	Federal Status	Tennessee State Status
American barberry	*Berberis canadensis*	-	SC
Bigleaf pondweed	*Potamogeton amplifolius**	-	Threatened
Branching bur-reed	*Sparganium sp.***	-	Endangered-PE
Broadleaf bunchflower	*Melanthium latifolium*	-	Endangered
Bugbane	*Cimicifuga rubifolia*	-	Threatened
Bush honeysuckle	*Diervilla lonicera*	-	Threatened
Butternut	*Juglans cinerea*	-	Threatened
Canada lily	*Lilium canadense*	-	Threatened
Carey's saxifrage	*Saxifraga careyana***	-	SC
False sunflower	*Tetragonotheca helianthoides*	-	Endangered
False foxglove	*Aureolaria patula***	-	Threatened
Ginseng	*Panax quinquefolius*	-	SC-CE
Goldenseal	*Hydrastis canadensis***	-	SC-CE
Large-tooth aspen	*Populus grandidentata*	-	SC
Meehan's mint	*Meehania cordata*	-	Threatened
Pondweed	*Potamogeton epihydrus**	-	SC
Purple fringed orchid	*Platanthera peramoena*	-	SC
Running strawberry bush	*Euonymus obovatus*	-	SC
Sapsuck	*Buckleya distichophylla*	-	Threatened
Smooth leaved honeysuckle	*Lonicera dioica*	-	SC
Sunrose	*Helianthemum canadense*	-	Endangered
Sunrose	*Helianthemum propinquum*	-	SC
Sweet pinesap	*Monotropsis odorata*	-	Threatened
Tennessee pondweed	*Potamogeton tennesseensis**	-	Threatened
Water purslane	*Didiplis diandra*	-	Threatened

***** *Species reported from the Little Tennessee River prior to impoundment of Tellico Reservoir and not encountered during this survey.*

****** *Species found during this survey.*

\- *No status.*

***Endangered-PE**: Endangered-Presumed Extirpated.*

***SC:** Special Concern.*

***SC-CE:** Special Concern-Commercially Exploited.*

3.3.1.2 Terrestrial Animals

Review of TVA Regional Natural Heritage Program databases indicated the presence of five rare terrestrial animals and one sensitive ecological area on Tellico Reservoir lands. Three additional protected animal species and three caves were found during field investigations by TVA biologists during the planning process. Of these species, only the bald eagle is federally listed. These species and areas are listed in Table 3.3.1.2-1.

Bald Eagle - Bald eagles are slowly increasing in numbers in eastern Tennessee. Two pairs of bald eagles nest on Tellico Reservoir lands. Nests are located near Ballplay and Citico Creek. These areas also provide important foraging habitat for bald eagles. A 1-mile buffer zone has been established around each nesting site according to USFWS regulations, and each nesting area has been designated a TVA Habitat Protection Area. Because of the eagles' rangewide population increase, in July 1999, the USFWS proposed to remove it from the list of endangered and threatened species.

Osprey - Several osprey were observed foraging on Tellico Reservoir during field surveys. Osprey are not known to nest on Tellico Reservoir. However, nesting platforms have been placed on the reservoir by the Tennessee Ornithological Society and TVA biologists. Osprey nest on nearby Watts Bar, Fort Loudoun, and Fontana Reservoirs. Due to recent increases in numbers throughout east Tennessee, osprey may soon nest on Tellico Reservoir.

Sharp-shinned Hawk - These small hawks were observed in Baker Hollow during summer surveys on Tellico Reservoir. While no nesting has been confirmed, one adult sharp-shinned hawk was observed attacking larger birds in the area, indicating a possible nesting territory in that area.

Common Barn Owl - Barn owls are uncommon throughout Tennessee. Nests are typically found in old barns, silos, and in small caves located in forested bluffs. They often nest in close proximity to man. A barn owl nest was found in a small cave in a bluff near Jackson Bend. Large amounts of owl pellets and skeletons of small mammals indicate that the nest has been used for many years.

River Otter - This semiaquatic mammal has been reported on Kirkland Island on the Little Tennessee River. Although not protected in western Tennessee, the species is listed as threatened in central and east Tennessee. In these areas, populations were decimated in earlier years. Reintroduction activities by TWRA and the Great Smoky Mountains National Park have increased numbers of river otters in eastern Tennessee. Other rare species of wildlife and plants occur on Kirkland Island and adjacent TVA lands.

Green Anole - This small lizard has been observed at several sites on Tellico Reservoir lands. This species can be found along bluff areas around the Tellico Reservoir. One green anole site, located at Little Tennessee River Mile 30, has been studied extensively by researchers from the University of Tennessee. This site is designated as a TVA Ecological Study Area (Zone 3). Smaller populations of green anoles have been observed near Fourmile Creek, Notchy Creek, and Corntassel Branch on Tellico Reservoir.

Junaluska Salamander - This small salamander was reported from the reservoir area prior to its impoundment. It is typically found in or adjacent to medium- to large-sized streams. Junaluska salamanders were reported along the Little Tennessee River prior to the construction of Tellico Reservoir.

Eastern Hellbender - This aquatic salamander was reported at several sites in the Little Tennessee River before its impoundment. Although not likely to be found in the reservoir, this species may still be found in Citico Creek.

Table 3.3.1.2-1 Listed Terrestrial Animals and Sensitive Ecological Areas Known From Lands Planning Parcels on Tellico Reservoir

Common Name	Scientific Name	Federal Status	Tennessee State Status
Bald Eagle	*Haliaeetus leucocephalus*	Threatened	Endangered
Osprey	*Pandion haliaetus*	-	Threatened
Sharp-shinned Hawk	*Accipiter striatus*	-	NMGT
Common Barn Owl	*Tyto alba*	-	NMGT
River Otter	*Lutra canadensis*	-	
Green Anole	*Anolis carolinensis*	-	NMGT
Junaluska Salamander	*Eurycea junaluska*	-	NMGT
Eastern Hellbender	*Cryptobranchus alleganiensis alleganiensis*	-	NMGT
Sensitive Ecological Areas			
Resource	**Justification**		
Kirkland Island and Adjacent Lands	Biologically significant including the presence of protected animals and plants.		
Unnamed Cave	Biologically significant including the presence of protected animals.		
Unnamed Cave	Biologically significant.		
Unnamed Cave	Biologically significant.		

NMGT - Listed as in need of management by the Tennessee Wildlife Resources Agency.
- No Status

Three caves were identified during lands planning surveys. Cave environments are extremely fragile, and species of animals that are associated with caves are often sensitive to human disturbance. One way to help protect the cave environment

would be to place a protective buffer around each cave opening. State-listed barn owls were found in one cave opening near Jackson Bend. Species of wildlife identified at the remaining caves include eastern pipistrelle (*Pipistrellus subflavus*), gray fox (*Urocyon cinereoargenteus*), and cave salamander (Eurycea lucifugus). Due to their biological significance, all these caves were identified as significant ecological areas.

TVA databases indicate three additional state-protected animal species within a 10-mile radius of the center of Tellico Reservoir. These species, listed in Table 3.3.1.2-2, include one bird, one reptile, and one amphibian.

Grasshopper Sparrow - This sparrow is typically found in early successional habitats such as hay fields or lightly grazed pastures. It has been reported from several fallow fields just west of TVA lands, and formerly occurred on several tracts transferred to TRDA. Recent statewide breeding bird censuses indicate that this species may be increasing in numbers in portions of Tennessee (Nicholson, 1997). Although the species was not found during summer surveys, grasshopper sparrows may utilize grasslands on Tellico Reservoir lands.

Eastern Glass Lizard - This snake-like lizard has been reported just east of the Little Tennessee River. Eastern glass lizards are usually found in dry, upland habitats having loose sandy soils. Population levels for this species throughout the state are not well known. Glass lizards may be found on more open, upland areas on Tellico Reservoir lands.

Black-bellied Salamander - This mostly aquatic salamander is typically found in small to medium-sized streams. Black-bellied salamanders have been reported east of Tellico Reservoir. Although listed as in need of management in Tennessee, this salamander is quite common in eastern Tennessee. This species may be found in smaller, cooler streams adjacent to Tellico Reservoir lands.

Table 3.3.1.2-2 Listed Terrestrial Animals Reported Within a 10-Mile Radius of Tellico Reservoir

Common Name	Scientific Name	Federal Status	Tennessee State Status
Grasshopper Sparrow	*Ammodramus savannarum*	-	NMGT
Eastern Glass Lizard	*Ophisaurus attenuatus longicaudus*	-	NMGT
Black-bellied Salamander	*Desmognathus quadramaculatus*	-	NMGT

NMGT - Listed as in need of management by the Tennessee Wildlife Resources Agency.
- No status.

Although not reported from Tellico Reservoir lands, additional protected terrestrial animal species may be found because many parcels contain suitable habitat for several listed species. Suitable habitat exists for the following species, listed in Table 3.3.1.2-3:

Gray Bat - Gray bats usually roost in caves throughout the year. They forage primarily over reservoirs and along stream corridors. The species has been reported from Fontana and Watts Bar Reservoirs. However, due to the lack of suitable roosting caves on Tellico Reservoir, gray bats probably use it on a limited basis.

Indiana Bat - This species roosts in caves during winter months and forms maternity colonies under loose tree bark during summer months. The Indiana Bat typically forages along stream corridors in addition to bottomland and upland forested areas. Recently, population levels of Indiana bats have been decreasing throughout its range. Indiana bats appear to be uncommon in eastern Tennessee. However, U.S. Forest Service personnel captured one Indiana bat in upland forests near Ballplay in 1998, less than 2 miles from Tellico Reservoir. Similar habitat exists on several Tellico Reservoir parcels.

Small-footed Myotis - This small bat usually roosts in crevices along bluffs and in caves. The distribution of this species in Tennessee is poorly known. Suitable roosting habitat was observed along bluff habitats on several Tellico Reservoir parcels.

Meadow Jumping Mouse - This species inhabits herbaceous cover near streams, old fields, and meadows. Although records indicate that this species may be more abundant west of the Tennessee River, meadow jumping mice may be found in suitable habitats on Tellico Reservoir lands.

Southeastern Shrew - This medium-sized shrew can be found in a variety of habitats ranging from deciduous forested areas to open field habitats. Although uncommon, this species has a wide distribution throughout Tennessee. Southeastern shrews may be found in a variety of habitats on Tellico Reservoir lands.

Cooper's Hawk - This medium-sized hawk typically nests in deciduous forests, often in close proximity to human dwellings. Although not common throughout Tennessee, population levels of Cooper's hawks are increasing. Many forested tracts on Tellico Reservoir contain suitable habitat for this species.

Table 3.3.1.2-3 Listed Terrestrial Animals Potentially Present on Lands Planning Parcels on Tellico Reservoir			
Common Name	**Scientific Name**	**Federal Status**	**State Status**
Gray Bat	*Myotis grisescens*	Endangered	Endangered
Indiana Bat	*Myotis sodalis*	Endangered	Endangered
Small-footed Myotis	*Myotis leibii*	-	NMGT
Meadow Jumping Mouse	*Zapus hudsonius*	-	NMGT
Southeastern Shrew	*Sorex longirostris*	-	NMGT
Cooper's Hawk	*Accipiter cooperii*	-	NMGT

NMGT - Listed as in need of management by the Tennessee Wildlife Resources Agency.
- No status.

3.3.1.3 Aquatic Animals

TVA databases indicate that several state- and federally-listed fish are known from waters adjacent to, and are potentially present in, Tellico Reservoir. These species and their status are listed in Table 3.3.1.3-1 and further described in the following paragraphs.

Duskytail darter - This darter is known from four widely separated localities in the Tennessee basin, including Citico Creek. In Citico Creek, the species has recently been found as far downstream as the backwaters of Tellico Reservoir. It is found in various sizes of rocky substrates, from small gravel, rubble/cobble, slabs, and bedrock substrates along the edges of gently-flowing shallow pools, eddies, and slow runs. Duskytail darters can often be found in association with detritus and some siltation, but are not found in areas where silt obscures the spaces between rocks.

Smoky madtom - The smoky madtom is known only from two streams, including Citico Creek. In Citico Creek, the species has recently been found downstream almost to the backwaters of Tellico Reservoir. During spring and summer, smoky madtoms inhabit riffles and runs and the shallow, gently-flowing heads and foots of pools. During the late fall and winter, they are found beneath slabrocks in pools.

Tennessee dace - Known from scattered, small tributaries in the Ridge and Valley physiographic province of the upper Tennessee River drainage, the Tennessee dace occurs in small woodland tributaries, usually 2- to 5-feet wide, often where there is some influence of springs. They inhabit pools, in association with undercut banks, brush, or other debris. Tennessee dace are known from areas in Ninemile Creek upstream from the TVA boundary. Habitat suitable for Tennessee dace may also exist in Baker Creek and Hammontree Branch on Tellico Reservoir properties.

Flame chub - Flame chubs are found in springs and spring-fed headwater streams in the upper and middle portion of the Tennessee River drainage. Flame chubs are not known to occur in waters adjacent to or in Tellico Reservoir. However, habitat suitable for flame chubs may exist in the spring run of Baker Creek.

Table 3.3.1.3-1 State- and Federally-Listed Fish Found in Adjacent Waters and Potentially Present in Tellico Reservoir

Common Name	Scientific Name	Federal Status	Tennessee State Status
Duskytail darter	*Etheostoma percnurum*	Endangered	Endangered
Smoky madtom	*Noturus baileyi*	Endangered	Endangered-
Tennessee dace	*Phoxinus tennesseensis*	-	NMGT
Flame chub	*Hemitremia flammea*	-	NMGT

NMGT - Listed as in need of management by the Tennessee Wildlife Resources Agency.
- No status

There are historical records of several additional aquatic species which existed in the reservoir area prior to impoundment, but are not likely to occur in the habitat presently available in the pool area. These include:

- One federally-listed endangered snail (Anthony's riversnail [*Athearnia anthonyi*]).
- One federally-listed endangered mussel (yellow blossom pearlymussel [*Epioblasma florentina florentina*]).
- Four fishes. One of these fishes is now a federal threatened species (snail darter [*Percina tanasi*]) and the other three are listed as in need of management in Tennessee (blue sucker [*Cycleptus elongatus*], tangerine darter [*Percina aurantiaca*], and blotchside logperch [*Percina burtoni*]).

3.3.2 Environmental Consequences

The following sections describe anticipated impacts to federally-listed, as well as state-listed, threatened and endangered species. The bald eagle, listed by the USFWS as threatened, is a resident in the reservoir area. Other federally listed species potentially occurring in the reservoir area are the gray bat, the Indiana bat, the duskytail darter, and the smoky madtom. TVA has determined that its proposed actions would not affect the gray bat, and are unlikely to adversely affect the Indiana bat, the bald eagle, the duskytail darter, and the smoky madtom. In accordance with Section 7 of the Endangered Species Act, TVA is requesting USFWS concurrence with these determinations.

3.3.2.1 Plants

Alternative A – Because no populations of federally-listed plants are known or likely to occur on Tellico Reservoir lands, no impacts to such species are expected. The four state-listed plant populations found in this survey occur on tracts designated as Dam Reservation (Cary's saxifrage) and Cultural/Public Use/Open Space Areas (goldenseal, bur-reed, and false foxglove) under the current designations. These and other populations of listed species that might be discovered in the future, would continue to be considered during TVA environmental review of individual projects, and protective or mitigative measures would be implemented as required by law and internal TVA policy. Therefore, no direct impacts to rare plants are anticipated from this alternative.

Many of the parcels being considered in this EIS contain potential, but currently unoccupied, habitat for listed species. Some of these parcels may be suitable for recovering state-listed species in the future, but that is not the overriding goal of the current allocations under Alternative A. Significant alteration of current management practices could diminish or eliminate the possibility of listed plants establishing new populations in the future.

Alternative B – Because no populations of federally-listed plants are known or likely to occur on Tellico Reservoir lands planning parcels, no impacts to such species are expected.

Under Alternative B, the internal TVA environmental review process would continue to address direct threats to listed plants. Populations of listed plant species that might be discovered in the future would continue to be considered during the environmental review of individual projects. Protective or mitigative measures would be implemented as required by law and internal TVA policy. The planning zones established in Alternative B would provide an additional level of protection for the ecologically-sensitive parcels by acting as a "first filter" in the early stages of project planning, thereby minimizing conflicting land use requests. No impacts to rare plants are anticipated from this alternative.

One species found during a survey, Carey's saxifrage, is located on the Tellico Dam Reservation. Under Alternative B, this parcel would be allocated to TVA Project Operations (Zone 2). Management of this parcel would focus upon operation of dam facilities, as well as protection of dam, switchyard, and transmission line integrity. The bluff habitat for this species is not likely to be impacted by these management practices.

Parcel 26, which contains two rare plants, is designated as Sensitive Resource Management (Zone 3). Under Alternative B, management would focus upon protection and enhancement of ecological function, and would provide a high level of protection for the integrity of the rare species found there. Parcels 3 and 4 contain a large population of false foxglove and would also be designated as Sensitive Resource Management (Zone 3) under Alternative B.

Under Alternative B, 74 percent of the land base being considered in this EIS would be designated as "Sensitive Resource Management" or "Natural Resource Conservation." Most parcels which would receive these designations contain potential habitat for one or more state-listed plant species. Management of Sensitive Resource Management parcels would focus upon protection and enhancement of ecological function, and would provide a high level of protection for the integrity of the significant natural features contained within them. Management of the Natural Resource Conservation parcels would focus upon manipulation of natural resources to enhance the quality of consumptive and nonconsumptive human activities such as hunting, timber harvesting, and wildlife observation. As with the Sensitive Resource Management parcels, this designation would increase awareness of the ecologically significant areas within them, would reduce conflicting usage requests, and would increase the level of protection provided to these sites.

3.3.2.2 Terrestrial Animals

Alternative A – Currently, decisions regarding the use of TVA lands adjacent to Tellico Reservoir are based upon the existing land use. That plan is similar to the proposed Alternative B. Both plans allocate tracts of land into specific categories such as recreation, wildlife, and cultural resources. However, current tract designations are based upon limited data. Under the existing plan, several tracts of excellent wildlife habitat around Notchy Creek Knobs and Blankenship Cemetery are designated as Cultural or Public Use areas. While this designation does afford these tracts some protection, many sites of these tracts can be very sensitive to human disturbance and need further protection. This alternative also provides no specific protection for the barn owl and caves near Blankenship Cemetery.

Effects to populations of terrestrial threatened and endangered species would be considered during TVA environmental reviews associated with specific projects. Therefore, no significant adverse impacts are expected. Although this would protect most populations of rare terrestrial animals, TVA's ability to address cumulative impacts to rare terrestrial animals would be limited.

Alternative B – Under this alternative, specific land use categories (i.e., Zone 3 - Sensitive Resource Management and Zone 4 - Natural Resource Conservation) would be designated and defined to protect sensitive terrestrial animals and their habitats and sensitive ecological areas. Parcels that are determined to provide habitat for federally-listed animals would be protected or managed for those species and habitats. Bald eagle nest sites were already designated as Natural/Wildlife areas under the current system. In addition, during land planning allocations proposed under Alternative B, a 1-mile buffer zone has been placed around each bald eagle nest and would be designated as a Habitat Protection area and placed in the Sensitive Ecological area category (Table 2.2.2-1, Zone 3).

Areas known to have populations of state-listed species such as green anole, barn owl, and river otter were designated as Sensitive Ecological areas or Ecological Study areas. Most of these sites were already in areas protected due to cultural resources. However, one area used by a small population of green anoles is currently designated as Residential. Under Alternative B, this area has been designated as a Sensitive Ecological area. Caves along Tellico River and near Blankenship Cemetery have been designated as Sensitive Ecological areas. Therefore, they would be better protected under Alternative B.

Parcels determined to have suitable "potential" habitat for protected terrestrial animals would be placed in Zone 4 where activities such as wildlife habitat management, hunting, and recreation would be allowed. These activities would benefit most listed species that may be found on these parcels. Much of the Notchy Creek Knobs area fits into this category. Most reservoir lands in the vicinity of Ballplay, where an Indiana bat was reported in 1998, would be placed in Zones 3 and 4. This would minimize potential impacts to any Indiana bats roosting or foraging in this area.

Under this alternative, the potential for cumulative impacts to rare species would be better assessed because the land planning process addresses all TVA Tellico Reservoir lands at one time. Areas determined to have rare species would be protected. Sensitive resources would be identified before specific projects arise and projects would only be considered on parcels already determined to be unsuitable for listed terrestrial animals or other sensitive resources.

Due to changing environments and the movement of wildlife, the environmental review process will be performed on individual projects. This allows TVA to identify new populations of listed species and provide protective or mitigative measures as required by the Endangered Species Act, National Environmental Policy Act and TVA policy. No significant negative impacts are anticipated from this alternative.

3.3.2.3 Aquatic Animals

Alternative A – Some lands critical for protecting sensitive aquatic animals have already been transferred to the TWRA as Wildlife Management areas. No other land parcels retained by TVA were identified as appropriate for land use categories specifically designated to protect sensitive aquatic animal species or specialized habitats. However, tracts managed as Natural/Wildlife Areas or Cultural/Public Use/Open Space Areas afford some protection that might be important for sensitive aquatic animals. In addition, existing environmental review procedures, including compliance with the Endangered Species Act, would assure that TVA actions would not likely adversely affect the habitat of rare species. However, while TVA would protect sensitive species during individual reviews, there is some potential for indirect or cumulative impacts under the No Action Alternative.

Alternative B – Some lands critical for protecting sensitive aquatic animals that have already been transferred to the TWRA as Wildlife Management areas would continue to be managed by TWRA. In addition, although no parcels were identified specifically to protect habitats necessary for state- or federally-listed aquatic species, Alternative B protects several large areas containing wetlands and other sensitive terrestrial habitats. Many of these areas will act as riparian buffer zones and, thus, will have an indirect but positive effect on aquatic habitat quality. Also, large lowland areas protected for cultural concerns may provide additional protection to aquatic habitats. Therefore, if any sensitive aquatic species are present, Alternative B will afford these species and/or habitat greater protection than the 1982 land use plan.

3.4 Terrestrial Ecology and Significant Natural Features

3.4.1 Affected Environment

Tellico Reservoir is located on the eastern edge of the Appalachian Ridge and Valley physiographic province of mideast Tennessee (Fenneman, 1938; Miller, et al., 1966), and is within the Appalachian oak forest as described by Kuchler (1966). It is bordered along much of its upper reaches (Tellico River-Ballplay Creek-Upper Little Tennessee River) by the United States Department of Agriculture's Cherokee National Forest. This area is predominantly forested upland habitat managed by the Forest Service to meet a diversity of public-oriented natural resources management and recreational needs. The eastern shoreline of the reservoir downstream from Vonore is bordered by typical east Tennessee rural landscape which includes a combination of small woodlots, orchards, livestock pasture and open hayfields associated with small farms. The western shoreline is predominantly developed as industrial property (TRDA Industrial Park, Niles Ferry Industrial Park) or residential property (Tellico Village, Rarity Bay). The lower end of the reservoir is predominantly land associated with the Tellico Dam Reservation which includes upland hardwoods, early successional habitats, agricultural land and beaver pond wetlands.

Forest is the predominant land cover type in the Tellico Reservoir area, and about 90 percent of the land area within one-fourth mile of the reservoir shoreline is forested (1994 TVA data). Forests adjacent to Tellico Reservoir make up a significant proportion of the total forest area in Loudon County. Due to the large forested areas in southern Blount and Monroe Counties, the Tellico shoreland forests make up a small proportion of the forest area in these counties.

TVA-retained lands total approximately 12,643 acres, most of which is in some type of forest cover. Hardwood types (upland, bottomland, and mixed) comprise about 46 percent of the forested area while mixed types (pine-hardwood, pine-cedar-hardwood, etc.) occupy 35 percent, pine 17 percent, and redcedar 1 percent. The remaining 1 percent of forested area includes idle/reverting fields and kudzu patches.

Upland hardwood is dominated by oaks (white, southern red, black, chestnut and scarlet) and hickories with smaller numbers of yellow-poplar, red maple, beech, and blackgum. Bottomland hardwood is restricted to low-lying areas along creeks and rivers and is occupied by sweetgum, red maple, ash, and sycamore. Most of the pine stands on Tellico Reservoir are located on areas that were previously agricultural fields; the majority of these reverted naturally to Virginia pine, but some smaller areas were planted with loblolly pine. Idle/reverting areas are dominated by shrubs and small trees including sumac, sassafras, persimmon, and dogwood.

Managed open lands on Tellico Reservoir include approximately 284 acres of agricultural licenses of hay or pasture. In addition to supporting domestic livestock, some of these tracts are cooperatively managed to provide browse for resident Canada geese. Outside of the actively-managed forest stands (about 12 percent of the land area being planned) and managed open land is significant acreage of unmanaged forest stands and open lands lying in narrow strips along the reservoir shoreline. Included are old fields in various stages of succession, and forested riparian edge. The wetland communities found on Tellico Reservoir properties make up a relatively small percentage of the existing land types and are discussed in Section 3.5, Wetlands/Riparian Ecology.

Natural resource inventories have identified a diversity of plant and animal life on Tellico Reservoir lands which can be attributed to the varying land forms and topography.

Mammals commonly found in these habitats include:

- gray squirrel
- white-tailed deer
- woodchuck
- eastern cottontail rabbit
- white-footed mouse
- raccoon
- opossum
- gray fox

Bird species using these habitats throughout the year include:

- wild turkey
- northern bobwhite quail
- woodpeckers
- song sparrow
- northern cardinal
- eastern bluebird

Neotropical migrant birds include:

- yellow-billed cuckoo
- red-eyed vireo
- yellow-throated warbler
- indigo bunting

Common reptile species utilizing these habitats include:

- eastern box turtle
- black rat snake
- five-lined skink

Table C-2.1 in Appendix C-2 lists many additional wildlife species found on TVA lands on Tellico Reservoir by community type. Moist productive bottoms are found along much of the Tellico River and other large tributaries; forested slopes characterize Notchy Creek Knobs and other areas; while steep wooded bluffs with an array of wildflowers occupy many shoreline areas. One such bluff also provides habitat for the largest known Tennessee population of the green anole, a lizard of primarily tropical distribution that is listed as in need of management in Tennessee.

Historically, TVA's resource management activities have been planned and implemented as a means of demonstrating environmentally acceptable and cost-effective strategies for managing publicly-owned natural resources. Many of these activities in the last 16 years occurred on mainstream TVA reservoirs which have been subjected to a lands planning process, with most lands allocated to specific categories based on technical data and public input. This long-term (ten years) allocation of certain lands to natural resource uses (i.e., Wildlife and Forest Management) has allowed TVA to invest time and money in some tracts to maintain and enhance biological diversity, protect sensitive wildlife species, and provide public use and enjoyment of the terrestrial environment.

Tellico Reservoir differs from most tributary reservoirs in that natural resources management and associated public use was a significant issue prior to and following reservoir inundation. An effort was made to delineate Natural/Wildlife Areas (1912 acres) on the reservoir as part of the Contract No. TV-60000A between TVA and TRDA, which dictated the framework for the development of Tellico Reservoir properties. TRDA properties that were allocated for Cultural/Public Use/Open Space Areas provide habitat for a variety of upland wildlife species previously mentioned. Other TRDA property that was allocated for Commercial Recreation and Industrial Development, such as Lower Jackson Bend and Wears Bend respectively, have not been developed to date and provide good habitat diversity for a variety of terrestrial resources. Wears Bend, which totals about 2000 acres, contains a variety of habitats and supports a substantial number of natural resource uses. It has been licensed to TWRA by TRDA for designation as a Wildlife Management Area on an interim basis.

In 1985, TWRA requested, and was granted, a license and easement from TVA allowing for development of a proclamated wildlife management area and waterfowl refuge on the upper portion of the reservoir. The Tellico Lake Wildlife Management Area (TLWMA) and Chota Waterfowl Refuge (CWR), which total approximately 6000 acres of land and water area between Little Tennessee River Miles 23 and 33, include land that was allocated to Natural/Wildlife Areas and Cultural/Public Use/Open Space Areas under Contract No. TV-60000A. In 1986, a waterfowl subimpoundment of approximately 100 acres was developed on the CWR through a cooperative effort by TVA, TWRA, and Ducks Unlimited, Inc. (DU). This was DU and TWRA's first Matching Aid to Restore States Habitat Project in the state of Tennessee and has been quite successful with the impoundment supporting an average of 2500 wintering migratory waterfowl.

At the same time TWRA was pursuing establishment of the TLWMA and CWR, TVA's wildlife program was actively initiating partnerships with Quail Unlimited, Inc. (QU) to jointly manage select parcels of Tellico Reservoir property to enhance habitat for upland wildlife. A cooperative agreement was established in 1986 between TVA and the Blount County Chapter of QU to cooperatively manage portions of the Carson Woods tract. This parcel was allocated for Cultural/Public Use/Open Space Areas under Contract No. TV-60000A. On April 26, 1996, the contract with the Blount County Chapter was canceled and replaced with Contract No. TV-99378V between TVA and the East Tennessee Chapter of QU. Since that time, this QU chapter has provided an estimated $7200 worth of leveraged management value on this tract in the form of native warm season grass establishment and the development of annual wildlife food plots.

Significant Natural Features

During the planning process, two areas on Tellico lands were identified as warranting protection because of the presence of ecologically significant plant communities: Upper Baker Creek, a riverine canebrake community, and Hall Bend, a combination of barren and bluff communities adjacent to a relatively mature hardwood forest.

Upper Baker Creek - A 1-mile stretch of stream with a forested riparian canebrake is located within this parcel. Much of the northern bank of the stream is grazed, and the site quality is significantly degraded. Along the southern bank, the canebrake occurs primarily in a narrow floodplain at the base of a steep slope. The floodplain and the adjacent hill are not grazed and have a mature oak/hickory forest, with additional riparian tree species in the floodplain. River cane is found continuously along this stretch, but the dense canebrake areas are sporadic.

This is by far the largest and highest quality canebrake encountered during surveys of Tellico Reservoir. Because of the rarity of high-quality examples of this community type, both regionally and globally, this is a particularly notable site on the reservoir and merits protection. The forest on the adjacent hillside should also be protected to provide buffer to this community.

Hall Bend - Located on the Tellico Dam Reservation, this half-acre site is an open, limestone bluff with a well-developed barrens' community. In east Tennessee, barrens are grass and herb-dominated sites which have shallow soil over limestone bedrock. These sites are similar in many ways to the barrens and glades of middle Tennessee and north Alabama, and are becoming increasingly uncommon in the Ridge and Valley physiographic province. No state- or federally-listed plants occur at the site, but because of the rarity of this community type in the region, it merits protection.

Large trees and high species diversity characterize the area surrounding the barrens. To the east of this site is a maturing oak/hickory/pine forest. While not of high significance regionally, this stand has large trees, few non-native species, and serves as an effective buffer to the adjacent limestone bluff. Significant disturbance to this stand would likely result in degradation of this high quality bluff community. In addition, this stand would enhance opportunities for passive recreation including hiking, photography, panoramic views, and nature appreciation. Improvements to this site, such as the upgrading of existing paths and posting of educational signs, would greatly increase the value of this unique feature. Hall Bend is the only area within the land planning parcels that is suitable for designation by TVA as a Small Wild Area. This site would be conveniently accessible by maintained roads presently in place on the Tellico Reservation.

3.4.2 Environmental Consequences

Terrestrial Ecology

Alternative A – Alternative A categorizes approximately 9592 acres under the Contract No. TV-60000A, Attachment A, as retained land uses of Natural/Wildlife Areas and Cultural/Public Use/Open Space Areas. Under Alternative A, most of this land could remain undeveloped and managed indefinitely for informal recreation. However, the current land use designations did not consider or provide for public input into the potential use of this land. Nor did the designations comprehensively consider the unique terrestrial characteristics or sensitive biological resources that occur on the land or how stakeholders use the natural resource amenities associated with these lands. With Alternative A, a large portion of TVA's retained land could remain undeveloped and managed indefinitely, primarily for informal recreation. However, future land use actions driven by TVA, TRDA, or other public or private entities could result in substantial impacts to terrestrial ecological resources on a localized basis.

Assuming no major changes in current land use patterns occur (triggered by development by TVA or TRDA as currently allowed on Cultural/Public Use/Open Space Areas), forested areas on Natural/Wildlife Areas and Cultural/Public Use/Open Space Areas designated lands would remain forested and continue to mature, with forest wildlife species remaining relatively stable at current levels. levels. The commercial recreation development associated with the Tellico Landing LLC project on TRDA's Lower Jackson Bend area (allocated for Commercial Recreation) will likely occur in the near future under this alternative resulting in the loss of some forest area and a change in wildlife use to species more adapted to manmade and altered environments. On other sites, as old fields and shrub areas continue to revert to forest, there will be a decrease in wildlife species dependent on these habitat types and a concomitant increase in forest wildlife species. Open lands licensed for hay crops or livestock grazing and the wildlife species using them would

likely remain unchanged. Agricultural license areas are considered "interim use" under the 1982 land use plan, and may be canceled at any time as the result of a TVA or TRDA action.

Under the current land use designations, TVA would continue to partner with QU to jointly manage upland habitats on the Carson Woods tract on a year-to-year basis. Expansion of this cooperative effort with QU and other conservation organizations and stakeholders onto other land parcels would be reactive and potentially restricted by competing land use requests. TWRA would continue to manage the TLWMA and the CWR in conjunction with TVA under a short-term revocable license agreement. According to TWRA, this license arrangement is currently precluding the development of additional long-term waterfowl habitat projects on CWR.

Any major changes in use patterns under the current land use designation system could create a corresponding change in vegetation and wildlife utilizing the affected tracts of land. For example, a change in use of the Carson Woods or Kennedy Branch/Ballplay Creek parcels from their current use as Cultural/Public Use/Open Space Areas (supporting hiking, informal camping, wildlife viewing, hunting, etc.) to developed Recreation (i.e., formal camping, golf course, public park, etc.) would create a major shift in vegetation and associated wildlife on the site, as well as the type of public use available to stakeholders. In general, increased development of these designated areas would result in a decrease in biological diversity over time on a reservoir-wide basis, with forest wildlife populations being the most impacted by the reduction in forest area and by the decrease in the average size of contiguous forested tracts (TVA, 1998a). However, under this alternative, the TLWMA and CWR, which comprise approximately one-third of the planned Cultural/Public Use/Open Space Areas acreage, would be committed to continued designation and management for wildlife habitat development by TWRA and TVA. Impacts to terrestrial ecology, wildlife habitat, and diversity would be insignificant with continued resource management and NEPA reviews of proposed future development of Cultural/Public Use/Open Space Areas. The cumulative impacts under this alternative would be considered insignificant on a regional basis.

Alternative B – Alternative B allocates 70 parcels of TVA land totaling 9956 acres to the categories of Sensitive Resource Management, Natural Resource Conservation, and TVA Project Operations. These three categories comprise approximately 79 percent of the retained land on Tellico Reservoir. Zone 2 parcels are included because of the existing natural habitats on these areas and the potential for enhanced resource management and associated public (stakeholder) use opportunities. The management of these parcels under Alternative B would be guided by written natural resources management unit plans that would:

- Develop and implement innovative and cost-effective strategies for maintaining and enhancing natural biological diversity.
- Manage and enhance sensitive natural resources.

- Provide for public use and enjoyment of forests, wildlife, and other natural resources on TVA lands.
- At appropriate locations, manage and produce natural resources-derived products (game and timber), consistent with TVA's multiple use and environmental leadership objectives.

These unit plans would be developed and reviewed with stakeholder input to manage natural resources consistent with sound biological practices and valid stakeholder needs. TVA would seek to maintain a high level of biological diversity in the terrestrial environment by managing a mix of forest land, open land, wetland, and riparian communities. This would provide a diversity of wildlife species which use these communities (see Appendix C-2, Table C-2.1). For example, vegetation may be managed in some forest stands to improve the diversity of tree species and sizes, release fruit- and nut-producing trees, develop small wildlife openings, and protect snags and wildlife nesting cavities. Open lands would be managed to provide a vegetation mix ranging from planted native warm season grasses to grown up, old fields and shrub edges.

Under Alternative B, TVA could maintain or change the current mix of terrestrial communities based on natural resource and stakeholder requirements. This alternative allows long-range planning (10 to 20 years) and implementation of terrestrial resource management schedules. This approach would result in long-term protection and improvement of terrestrial resources on a local basis. Any negative management impacts would be temporary and insignificant. The forested area on the planned tracts would likely remain fairly constant or slightly increase over time. On a reservoir-wide basis, some loss of forest area, and additional fragmentation of the remaining forest, would likely occur as a result of residential and other development. For example, since there is no change in land allocation for TRDA's Lower Jackson Bend, the commercial recreation development associated with the Tellico Landing LLC project will also likely occur in the near future under this alternative resulting in the impacts described above.

Alternative B would provide for enhanced management and protection of terrestrial ecological resources on Tellico Reservoir properties. This would result from a longer commitment of certain land parcels to specific designations such as Sensitive Resource Management and Natural Resource Conservation. Also, the subsequent development of unit management plans would maintain and enhance natural biological diversity on these parcels. Selection of this alternative would result in insignificant negative impacts on terrestrial ecological resources on a regional and cumulative basis, and consequently improved future protection and management of terrestrial resources, wildlife habitat, and diversity on a reservoir-wide basis.

Significant Natural Features

Alternative A – Under Alternative A, the internal TVA environmental review process would continue to address impacts to sensitive resources. As classified in

the Tellico Reservoir existing plan land use designation definitions (Table 2.2.1-1), Hall Bend is designated to be managed under the Dam Reservation lands. This is land that is managed primarily for the protection of the dam and the associated switchyards and power lines. The Upper Baker Creek canebreak community is designated as a Cultural/Public Use/Open Space Area and managed to protect and enhance cultural and scenic attributes of the subject area.

Under Alternative A, sensitive areas may be protected, however, this would not be a specific goal for the management of these parcels. There would be little long-term assurance of the protection of these features.

Alternative B – Under Alternative B, the internal TVA environmental review process would continue to address impacts to sensitive resources. Alternative B provides enhanced protection of significant natural features and plants and animals utilizing parcels allocated to Zones 3 and 4. The allocation of the Upper Baker Creek area, Parcel 39, to Zone 3 - Sensitive Resource Management, gives this unusual canebreak community an enhanced level of protection. The Hall Bend site, a portion of Parcel 1, is allocated to Zone 2 - Project Operations. This zone offers a level of protection similar to that previously available under Alternative A. Due to the distance from the Tellico Landing LLC project, there will be no cumulative impacts on Upper Baker Creek canebreak plant community. There will be no direct cumulative impacts on Hall Bend cedar glade due to the distance from the Tellico Landing LLC project. Tellico Landing property is within foreground views of Hall Bend. Minor impacts to the viewshed from commercial development are anticipated.

3.5 Wetlands/Riparian Ecology

3.5.1 Affected Environment

As defined by TVA Environmental Review Procedures:

> Wetlands are those areas inundated by surface or groundwater with a frequency sufficient to support, and under normal circumstance, do or would support a prevalence of vegetation or aquatic life that requires saturated or seasonably saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, mud flats, and natural ponds (TVA, 1983).

Wetlands along TVA's reservoirs tend to be diverse and highly-productive components of the overall reservoir ecosystem and are considered the normal circumstance under current reservoir operation scenarios. They provide habitat for many wildlife species, serve as shoreline stabilization zones, support rare plant species, aid in flood control, and contribute to improved water quality. Wetlands are typically transitional ecosystems between terrestrial and aquatic communities. In the Ridge and Valley Province, lower slope/terraced lands and floodplains represent a small percentage of the landscape relative to the uplands, mainly due to the geology

of the region (Martin, 1989). They were, however, substantially more widespread prior to impoundments on the Tennessee River and its tributaries (Martin, 1989). TVA's impoundments inundated the previous riverine and upslope habitats creating new wetland areas and many miles of terrestrial shoreline riparian habitat (Amundsen, 1994).

Wetlands in the Tellico Reservoir area were inventoried from aerial photographs in the early 1990s (TVA, 1998a). This inventory showed about 180 acres of wetlands within the normal reservoir drawdown zone, 687 acres of wetlands between the summer operating range and the maximum shoreline contour (msc), and 145 acres of wetlands in the area between the msc and one-fourth mile inland from the msc. The majority of the wetlands within the drawdown zone were aquatic bed wetlands; while the majority of wetlands in the other zones were forested and scrub/shrub wetlands. A separate, more recent inventory of the residential access shoreline (69 miles) found that about one fourth of this shoreline supports wetland vegetation.

The Tellico Reservoir land being planned, which includes lands below the 820 msc fronting TRDA developed residential and industrial areas, supports approximately 900 acres of wetlands, found in over 700 locations scattered along the length of the system. Most wetlands are located below the 820 msc, with many found immediately adjacent to the summer water level shoreline. The most significant and largest wetlands are found in the backs of shallow coves and embayments, especially where creeks and rivers enter the reservoir. This approximate 7 percent of the TVA-retained property on Tellico Reservoir is disproportionately high in ecological importance when the functions and values of these wetland areas are considered. A variety of wetland types are represented with emergent, scrub/shrub, and forested, as described by Cowardin, et al. (1979), being the most common.

Common vegetation associated with these wetlands includes:

- common cattail
- soft rush
- various sedges
- buttonbush
- black willow
- brookside alder
- green ash
- lizard's tail
- soft-stem bulrush
- smartweed
- lead bush
- silky dogwood
- red maple
- sycamore

Aquatic bed wetlands, comprised primarily of Eurasian watermilfoil, naiads, and parrotfeather, are found in some years primarily in the Tellico River arm of the reservoir and the upper end of the reservoir near the mouth of Citico Creek.

In addition to supporting plant community diversity, Tellico wetlands and adjacent shallow waters provide habitat for a variety of waterfowl, wading bird, songbird, amphibian, reptile, and mammal species.

Common waterfowl/wetland birds using these habitats for feeding areas, resting cover, and/or breeding areas include:

- wood duck
- mallard
- mergansers
- killdeer
- American woodcock
- Canada goose
- American black duck
- sora
- common snipe

Common wading/water birds include:

- great blue heron
- black-crowned night-heron
- gulls
- double-crested cormorant
- green-backed heron
- common loon
- osprey

Songbirds include:

- red-winged blackbird
- common yellowthroat
- blue-gray gnatcatcher
- swamp sparrow
- yellow warbler
- northern parula

Amphibians include:

- bullfrog
- green frog
- American toad
- spring peeper
- western chorus frog
- dusky salamander

Common reptiles include:

- northern water snake
- snapping turtle
- painted turtle

Mammals known to use wetland and riparian areas include:

- muskrat
- mink
- beaver
- raccoon

Additional species are listed in Appendix C-2 Table C-2.1.

Some of the most significant Tellico Reservoir wetlands are found in the upper reaches of Ballplay, Citico, Baker, and Notchy Creeks, and along the upper reaches of the Tellico River arm, especially between River Miles 15.5 and 17.5. A large wetland complex associated with two large beaver ponds is located on the easternmost portion of the Tellico Dam Reservation adjacent to Watts Bar Reservoir. These areas are a mosaic of forested, scrub-shrub, and emergent wetlands, and in some years have adjacent shallow water aquatic bed habitat. High quality habitat for numerous wildlife species is provided by these areas. Additional wetland functions include shoreline stabilization, water quality, plant community diversity, and landscape diversity. Values associated with these functions include wildlife observation and study, hunting, and visual aesthetics.

3.5.2 Environmental Consequences

Alternative A – Through the shoreline categorization process, about 5 miles of residential access shoreline identified as supporting wetland vegetation were placed in the Residential Mitigation Zone, where private water use facilities could be permitted with appropriate mitigation. The protection of riparian habitats would also be increased in the other 33 miles of Residential Mitigation shoreline and in the mile of shoreline in the Shoreline Protection category.

The approximate 700 wetland areas (900 acres) located on TVA-retained land on Tellico Reservoir are found in most all of the current land use designation categories. Under Alternative A these areas would most likely remain largely unchanged, although some emergent wetlands may gradually mature to shrub/scrub wetlands. Wildlife species using these areas should remain unchanged (see Appendix C-2, Table C-2.1). Even though the current land use designation could change on these areas under Alternative A, this action would be subject to TVA NEPA review and compliance with Executive Order (EO) No. 11990 (Protection of Wetlands). EO No. 11990 directs federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

Selection of Alternative A would have an insignificant impact on wetlands and associated functions and values on a regional or subregional basis. Wetlands located on areas currently designated for Dam Reservation or Industrial Development, while protected from most direct impacts through compliance with EO No. 11990, could suffer indirect impacts to some functions and values on a local basis. The shoreline below the 820 msc fronting the proposed Tellico Landing LLC project at TRDA's Lower Jackson Bend currently supports approximately 1 acre of forested and scrub/shrub wetland. Direct impacts to these wetlands will be avoided through the Section 26a permitting process for shoreline facilities associated with adjoining commercial recreation development. Because of the requirements of EO No. 11990 and the residential shoreline wetland categorization system required by the SMP, cumulative impacts to wetlands on a reservoir or regional basis would be insignificant.

Impacts to wildlife dependent on wetlands would also be insignificant. As described in the SMI EIS (TVA, 1998a), some loss of suitable habitat for wintering waterfowl would result through residential development on former TVA lands and on shorelands with deeded access rights. Because the current land uses of many of the areas on the reservoir with high quality waterfowl habitat would likely continue, overall effects on wintering waterfowl would likely be minor.

Alternative B – The protection of wetlands and riparian habitats (in Zone 7) as a result of the shoreline categorization, described under Alternative A, would also occur under Alternative B. Alternative B would also allocate approximately 260 acres of wetlands with especially substantial ecological functions and values to Sensitive Resource Management (Zone 3). The remaining 640 acres of wetlands are

scattered across the other zone designations, with approximately 75 percent found in Zone 4. Zone 3 and 4 areas, along with portions of Zone 2, would be part of TVA's unit planning process as described in Section 3.4.2. This planning process would emphasize sensitive natural resources on TVA lands and develop management strategies to preserve and enhance the functions and values of these wetland resources. Under this scenario, wetlands would be managed to protect and/or enhance the hydrology, soils, and vegetation of each wetland system to improve overall functions and values. Riparian communities would be managed to allow the natural development of native vegetation or restored through bioengineering where shoreline erosion is impacting these areas.

Selection of Alternative B would provide a beneficial effect to wetland resources on TVA lands and best protect current wetland functions and values. Impacts on wetlands and riparian resources associated with the public recreation projects proposed in Alternative B are expected to be minor and insignificant on a reservoir and regional basis, as highly functional wetlands are not found on the proposed recreational areas. This is the case with the approximate 1 acre of wetland located below the 820 msc fronting the proposed Tellico Landing LLC project at TRDA's Lower Jackson Bend area. Direct impacts to these wetlands would be avoided through the 26a permitting process for shoreline facilities associated with adjoining commercial recreation development. Wetlands and riparian habitats located along the upper Tellico River would be further protected and enhanced through the River Corridor designation. Protective guidelines for shoreline development associated with backlying landowners with ingress/egress rights are also proposed. In addition to the protection and enhancement of wetlands located in Zones 3 and 4, development and implementation of unit resource management plans and the requirements of EO 11990, the implementation of the residential shoreline wetland categorization system required by the SMI would result in insignificant, cumulative impacts to wetlands on a reservoir and regional basis.

Impacts to wildlife dependent on wetlands would likely be beneficial because of the long-term commitment of additional lands for natural resource protection and enhancement. As described in the SMI EIS, some loss of suitable habitat for wintering waterfowl would result through residential development on former TVA lands and on shorelands with deeded access rights. This decrease, however, could be offset through enhanced waterfowl management on lands allocated to Zones 3 and 4.

3.6 Recreation

3.6.1 Affected Environment

Recreation on Tellico Reservoir is influenced in large part by the surrounding urban areas, the planned residential development around the reservoir, and the population from the adjoining communities and counties. The reservoir setting offers a blend of beautiful mountain scenery as a backdrop to a lake area easily accessible by a regional population in the counties of Blount, Loudon, Monroe, and Knox estimated

to be in excess of 525,000 and projected to increase to over 650,000 by the year 2010. Demands for water-based recreational activities are expected to increase as a result of continuing residential development of privately-owned land around the reservoir and the anticipated population increases. The President's Commission on Americans Outdoors (1986) and Governor's Commission on Tennesseans Outdoors (1986) reports recognized that opportunities for development of recreational corridors utilizing greenways and waterways were quickly disappearing and their designation/development would help meet recreational needs of the 21st century.

There are two marinas, 14 well-dispersed public boat ramps, and several tracts of land on which TVA has sold or provided land rights to the TRDA, TWRA, and local agencies for development and management of public and commercial recreation areas. TRDA has existing rights to manage its land for public and commercial recreation purposes, and rights to use TVA property below the 820 msc. The Plan does not change these rights, and the proposed Tellico Landing LLC development is located on property (Lower Jackson Bend) where these rights exist. In addition, the TDEC manages the 850-acre Fort Loudoun State Historic Park for public recreation, wildlife management, and historic and scenic preservation purposes. The Eastern Band of the Cherokee Indians manages the Sequoyah Birthplace Museum located near the state park. Some of these tracts are not yet fully developed or utilized.

Based on comments provided to TVA through a questionnaire about Tellico Reservoir, the primary percentage of recreational activity preferences as expressed by respondents are waterskiing (88 percent), boat fishing (85 percent), pleasure boating (84 percent), boat launching (82 percent), swimming (80 percent), marina/boating (76 percent), and bank fishing (73 percent). Over 51 percent of respondents reported that if appropriate facilities were provided, they would participate in bike riding, camping at developed sites, hiking, horseback riding, special events, or swimming in designated areas. Informal recreation occurs at numerous locations where public access exists. Among other planning priorities, questionnaire respondents indicated TVA should place a high priority on boat ramps and land uses associated with maintaining the natural character of reservoir property. They also expressed that TVA should not be involved in boat stack storage or theme parks.

3.6.2 Environmental Consequences

Alternative A – A large portion of TVA's retained land on Tellico Reservoir has allocations designated in 1982 which provide for informal public recreation such as bank fishing, bird watching, camping, and hiking. These allocations are primarily comprised of the land within the Cultural/Public Use/Open Space Areas and Natural/Wildlife Areas which encompass 9592 acres. This land could remain undeveloped and managed indefinitely for informal recreation. With the exception of the Tellico Dam Reservation, the only other reservoir property designated for recreational development has been conveyed to TRDA for management or the private sector. Although there is no TVA property allocated specifically for public or commercial recreational development, the land currently allocated Cultural/Public Use/Open Space Areas could be considered for development by TVA, another public

agency, or the private sector as demand dictates. If the land is made available for non-TVA development and management as defined in Contract No. TV-60000A. TRDA would have right of first refusal.

The current land use designations did not comprehensively consider public input, the scenic qualities, unique characteristics, cultural or sensitive biological resources which affect how land could or should be utilized. Continuing to use the 1982 land use designations precludes comprehensive public input and an application of broad public values. The cumulative effects of selecting this alternative could result in less than optimal allocation of lands for recreation and some reduction in potential long-term recreational benefits on Tellico Reservoir. The commercial recreation development associated with the Tellico Landing LLC project on Lower Jackson Bend will likely occur in the near future under this alternative generating some increase in recreational use around the reservoir.

Alternative B – Alternative B comprehensively addresses the existing physical characteristics of land being planned around Tellico Reservoir, current recreational use patterns, public input, anticipated recreational needs, and public values pertaining to recreational use of this property. Existing commitments for land rights to public agencies and the private sector remain intact and are not adversely affected. Changes in management of some existing recreational areas or expressions of interest from other public agencies have created opportunities to consider new recreational uses and the potential for additional recreational development. This is reflected with specific allocations which increase the land committed for recreational use from 1500 acres in Alternative A to 1803 acres (an addition of approximately 20 percent) in Alternative B.

Primary additions include allowing for development of a Greenway on the lower portion of Tellico Reservoir from Little Tennessee River Miles 4.7-9.5. The Greenway could potentially create 6-10 miles of trails for a variety of public uses including hiking and/or horseback riding, and provide better access to public land. In association with the Greenway, three to five points of ingress/egress are envisioned for parking and restrooms throughout the Greenway segment, with a primary service node midway at Coytee Springs. Coytee Springs (Parcel 10) is envisioned as a stand-alone, day-use park area which could serve area residents, as well as be a component of the Greenway. Other primary recreation allocations would provide for expanded public and commercial recreation development opportunities within Vonore to serve both the Eastern Band of the Cherokee Indians' interest to develop a resort and future local public park development.

Improved access to the riverine portion of the reservoir is proposed on the Tellico River with a lake-oriented access area at Tellico River Mile (TRM) 12.0, and a canoe/small boat access area at TRM 18.3. These allocations would enhance public access to the river and also lend support to the designation of a portion of the Tellico River as a "River Corridor" for 7.4 river miles from TRMs 13.3-20.7. The "River Corridor" designation creates specific guidelines for development of private water

use facilities which are intended to preserve as much of the natural character of the river as possible, as well as provide reasonable access to the river by property owners with landrights. This designation would help maintain plant and animal habitat, reduce vegetation removal minimizing future shoreline erosion, provide a passive/natural environment for recreational boating and fishing, and create opportunities for compatible development within an area of the reservoir which has basically remained in a pristine state. Guidelines for facility development within three River Corridor segments are proposed (Appendix B-1) for the lower river segment (TRM 13.3 to 15.1), middle river segment (TRM 15.1 at Sloan Bridge to TRM 18.5), and upper river segment (from TRM 18.5 to the upper limits of TVA landrights at TRM 20.7). The "River Corridor" private water use facilities guidelines identify the types and sizes of facilities recommended within each of these segments.

Informal recreation use is a component of, and a compatible use within, Zone 3 (Sensitive Resources) and Zone 4 (Natural Resource Conservation) and can be accommodated on an interim basis within other zones, until the specific allocated use is defined, such as Residential or Industrial Development, and occurs on that land. Alternative B will result in allocations of 9321 acres for Zones 3 and 4. When these two zones are compared to comparable zones (Cultural/Public Use/Open Space Areas and Natural/Wildlife Areas, with 9592 acres) receiving informal recreation use in Alternative A, this results in a 2.8 percent reduction of informal recreation use land (271 acres). However, future recreational development land needs have been considered based on public input and agency responses resulting in the allocation of 274 acres in Zone 6 (Recreation) which should meet future public recreational demand more comprehensively.

The cumulative effects of selecting this alternative would create additional recreational benefits and provide new public recreational opportunities where population growth is anticipated and recreational uses can complement the physical resource. Although this would result in a reduction in land currently available for informal recreational use, the proposed allocations are long-term and well-dispersed around the reservoir and should not significantly affect informal uses. Since there is no change in a land allocation for Lower Jackson Bend, the commercial recreation development associated with the TLI project will also likely occur in the near future under this alternative generating some increase in recreational use around the reservoir.

3.7 Water Quality

3.7.1 Affected Environment

Watershed Description – Tellico Reservoir is located in Little Tennessee River watershed in both the Blue Ridge and the Ridge and Valley Provinces. The watershed encompasses 2,627 square miles in North Carolina, Tennessee, and

Georgia. The upper 75 percent of the watershed consists of mountainous terrain characterized by steep slopes and heavy forest cover. Runoff from this area is controlled by dams above Tellico Reservoir on the Little Tennessee River and several of its upstream tributaries. The remainder of the watershed consists of the minor tributaries draining directly into the reservoir (365 square miles) and the Tellico River watershed (285 square miles). The Tellico River watershed is primarily rugged terrain and the minor tributaries drain an area consisting of more gently rolling hills (TVA, 1985a; TVA, 1981). Approximate land use in the Little Tennessee watershed is 83 percent forest, 12 percent pasture, 3 percent water, and 2 percent cropland (TVA, 1996a).

Hydrologic Units – Hydrologic Unit Codes (HUCs) are assigned by the U.S. Geological Survey to watersheds ranging in size from the two-digit region codes to the smaller eight-digit cataloging units. The Little Tennessee River watershed is divided into two cataloging units called the Lower Little T (06010204) and the Upper Little T (06010202). TVA manages watershed initiatives that are based on conditions of watersheds using input from stakeholders, coalitions, local governments, and state and federal agencies. Initiatives are undertaken to maintain or improve stewardship practices, land and water quality, biological health and diversity, recreational opportunities, use of best management practices (BMPs), and the establishment of riparian and ecological corridors that link landscape features and inhabitants. HUCs or watersheds that drain into Tellico Reservoir are ecologically rated as poor, fair, or good (Figure 3.7-1). Appendix C-3 includes the HUC number, the primary stream draining the HUC, condition of the HUC, the primary resource issues associated with the respective HUC rating and TVA land parcels within that HUC. Ratings are based on the professional judgment of TVA land and water resource specialists after consideration of Index of Biotic Integrity (IBI) sampling results, condition of aquatic habitats in the watersheds, and land uses. Although both systems use three levels of designation, HUC ratings (i.e., good, fair, or poor) are not directly comparable to state water quality designations which identify streams as either impaired, partially impaired, or unimpaired for various use categories. Approximately 49 percent of the acreage of TVA land being planned is in watersheds with fair HUC rating (see Appendix C-3). The remaining land is in watersheds rated poor.

Climatology – Mean annual precipitation in the lower Little Tennessee River watershed below Chilhowee Dam ranges from 51.8 inches to 55.4 inches, while mean annual precipitation in the upper reaches of the watershed above Chilhowee can exceed 90 inches. Mean monthly precipitation is relatively constant, with a tendency toward maximum rainfall in March and minimum rainfall in October. The mean annual air temperature at the National Weather Service station in Lenoir City is 58.2ºF. Mean monthly temperatures range from 38.7ºF in January to 77.3ºF in July (TVA, 1981).

Reservoir Description – Tellico Dam was the last dam completed in the TVA system, with dam closure in 1979. It is located at Little Tennessee River Mile

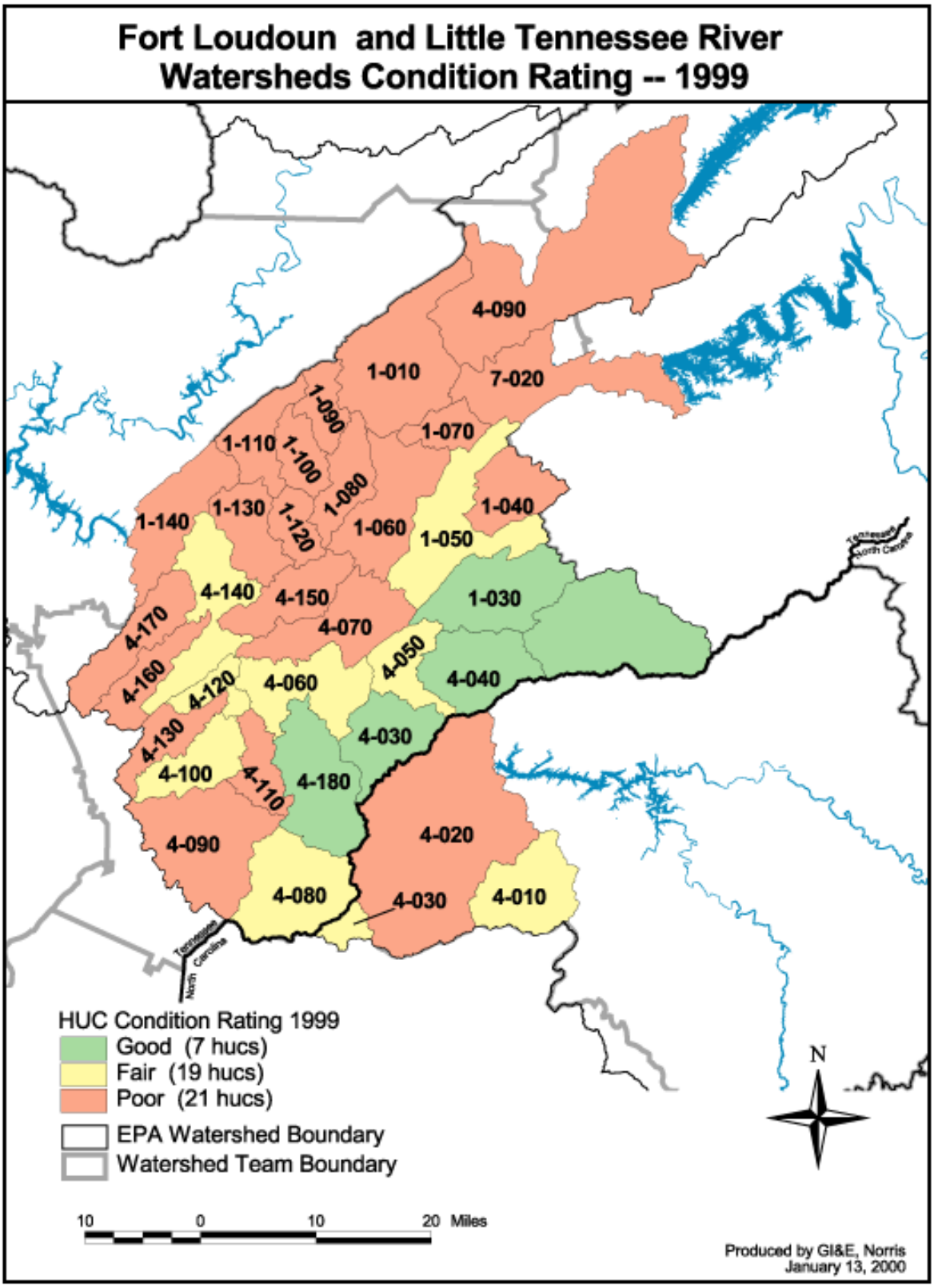
(LTRM) 0.3, just upstream of the confluence of the Little Tennessee and Tennessee Rivers. Tellico Reservoir extends 33 miles up the Little Tennessee River to Chilhowee Dam and 18 miles up the Tellico River. It has 361 miles of shoreline and has a surface area of approximately 16,500 acres at summer operating range. Reservoir depth ranges from 82 feet near the dam (forebay) to more riverine conditions upstream near Chilhowee Dam. The normal fluctuation between the summer operating range and the winter operating range is 6 feet. The average flow for the period of record is 6213 cubic feet per second with an average retention time of approximately 37 days. Very little of the water is discharged through Tellico Dam. Instead, it is routed through a navigation canal to Fort Loudoun Reservoir near the dam for hydroelectric generation (TVA, 1985b; TVA, 1981).

General Water Quality Characteristics – Tellico Reservoir is generally considered a low productivity reservoir (oligotrophic) with low nutrient and biochemical oxygen demand concentrations due to the geologic characteristics of the region. The upstream reach (LTRMs 20.0 to 33.6) receives primary inflow from Chilhowee Reservoir and is essentially riverine with water quality similar to the Chilhowee release (cold and nutrient poor with low mineral content). The middle reach of the reservoir (LTRMs 3.0 to 20.0) is deeper and wider, receiving inflow from the Tellico River as well as from Chilhowee. This segment of the river has a greater volume and a longer residence time than the upper reach, and water quality is more influenced by internal reservoir processes. Water quality in the downstream reach of the reservoir (LTRMs 0.3 to 3.0) is influenced not only by local inflows and internal reservoir processes, but also by the hydrodynamics and exchange of water through the canal connecting Tellico and Fort Loudoun Reservoirs (TVA, 1981). The canal is only 20 to 25 feet deep and the Tellico forebay is 82 feet deep. The result is that water at strata below the 25-foot depth is essentially trapped and becomes anoxic during much of the summer (TVA, 1998b).

Recent TVA Water Quality Monitoring and Results – TVA's reservoir (and stream) monitoring programs were combined with fish tissue and bacteriological studies in 1990 to form an integrated Vital Signs Monitoring Program designated to systematically monitor reservoir ecological conditions. Vital Signs Monitoring activities focus on:

(1) physical/chemical characteristics of waters
(2) physical/chemical characteristics of sediment
(3) benthic macroinvertebrate community sampling
(4) fish assemblage sampling

Figure 3.7-1 Fort Loudoun and Little Tennessee River Watershed Condition Rating - 1999



The monitoring program includes two sampling sites in Tellico Reservoir, the forebay located at LTRM 1.0 and the mid-reservoir transition zone located at LTRM 15.0 (LTRM 21.0 in 1990, 1991, and 1992) (TVA, 1996b).

Vital Signs Monitoring ratings of the overall ecological condition of Tellico Reservoir have been fair since the program began. Table 3.7.1-1 shows water quality ratings from Vital Signs Monitoring data. The water quality indicator which has shown the most variation over time is dissolved oxygen (DO) at the forebay location, which rated good in 1994, poor in 1995, fair in 1997, and good in 1999 (Tellico was not sampled in 1996 or 1998). DOs in the forebay are strongly correlated with reservoir flow. 1995 was a very low flow year due to low runoff during an extremely dry spring and summer, and efforts to fill Fontana Reservoir. Chlorophyll also received a poor rating at the forebay location in 1995 because of the low flows, which increased residence time, and the inflow of chlorophyll-rich water from Fort Loudoun via the canal. Sediment at the forebay station was rated fair instead of good due to measurements of Aldrin and Dieldrin above recommended guidelines. All water quality parameters at the transition zone location rated good during 1995 (TVA, 1996b; TVA, 1998b).

Table 3.7.1-1 Water Quality Ratings, Vital Signs Monitoring Data

Location & Elements Monitored	Monitoring Years			
	1994	**1995**	**1997**	**1999**
Forebay				
Dissolved Oxygen	good	poor	fair	good
Chlorophyll	fair	poor	poor	good
Sediment	fair	fair	good	good
Mid-Reservoir				
Dissolved Oxygen	good	good	good	good
Chlorophyll	good	good	fair	poor
Sediment	fair	good	good	good

Tellico was not sampled in 1996 or 1998.

In addition to the fair DO rating at the forebay location, 1997 monitoring there resulted in poor chlorophyll and good sediment ratings. Transition zone ratings were good for DO and sediment, but for the first time since monitoring began, chlorophyll was rated fair instead of good. Another occurrence seen for the first time in 1997 was a small area of low DO in water near the bottom at the transition zone during the summer (TVA, 1998b).

Chlorophyll concentrations have shown an upward trend at both locations during the last seven years. At the forebay, chlorophyll concentrations are impacted by the exchange of water from the highly productive Fort Loudoun forebay via the canal. However, no such influence exists at the transition zone location, where average

summer chlorophyll levels have increased about 140 percent from 1993 to 1999. The increased chlorophyll level means an increase of algal growth which may be due to increased nutrient loading in the reservoir (TVA draft data).

TVA did not conduct bacteriological sampling on Tellico Reservoir in 1995 or 1997. TVA monitored fecal coliform bacteria levels at four beaches in 1998. All were within State of Tennessee guidelines for water contact, except for elevated bacteria levels in one of the ten samples collected at the Toqua site following a rainfall event (TVA draft data). There are no water contact advisories for Tellico issued by the state of Tennessee.

Recent Evaluations by the State of Tennessee – The 1996 TDEC water quality assessment report, known as the 305(b) Report, listed all of Tellico Reservoir as impacted/not supporting designated stream use classifications. Listed causes were priority pollutant organics, organic enrichment/DO, nutrients, siltation, and flow alteration resulting from some combination of sources including runoff from pasture land, land development, impoundment and hydroelectric generation, and contaminated sediment. Tributaries to the reservoir listed in the 305(b) Report either as not supporting or only partially supporting stream use classifications were Fork Creek, Baker Creek, Notchy Creek, and Abrams Creek (TDEC, 1996). The state 305(d) List, established as part of the Total Maximum Daily Load (TMDL) Program, also included all of Tellico Reservoir as not supporting use classifications due to PCBs found in contaminated sediment (TDEC, 1998). Additional nonsupporting tributaries identified by the Tennessee Rivers Assessment Program due to water quality problems were Island Creek and Ninemile Creek (Tennessee Rivers Assessment Program, 1998).

3.7.2 Environmental Consequences

Alternative A – Under this alternative, few tracts of TVA property are designated specifically for protection of sensitive resources, and the extent of protection of natural resources in other designations (such as the Cultural/Public Use/Open Space Areas) would be uncertain. Although protection of the natural reservoir shoreline may be undertaken as a secondary consideration on tracts designated for various uses, including natural resource protection or conservation, the resulting benefits to reservoir water quality may not be a primary consideration when land use decisions are made.

Under Alternative A, the extent to which land uses under the existing plan might affect water quality depends on the nature and extent of development. Under this alternative, future land use and development on parcels within the 1982 land use plan is less restricted. Additional residential, industrial, and recreational developments on either TVA or private property have the potential to result in some degree of increased soil erosion due to clearing of woody vegetation and brush, increased runoff of agricultural/lawn chemicals, increased sewage/septic loading, and an increase in currently unknown contaminants if additional point source permits are issued on the reservoir. Negative impacts to water quality associated with these

activities include increased turbidity, increased levels of substances toxic to aquatic life, increased bacteriological content, and further increases in nutrient loading which is already occurring in the reservoir.

Use of vegetated buffer zones and other best management practices would minimize some damaging effects of riparian vegetation removal associated with development. In addition, protective measures presently in place under TVA's permitting process, and included in TVA's Shoreline Management Policy (SMP) (TVA, 1998a), will substantially offset impacts of development of private property. New facilities with permitted discharges would be required to meet permit limits as well as possible future TMDL limits. With knowledge of the condition of the reservoir, activities under Alternative A should not significantly impact water quality.

Alternative B – This alternative would provide a better opportunity to protect water quality by identifying Sensitive Resource Management or Natural Resource Conservation (Zones 3 and 4, respectively) as the designated use on some tracts now having general designations such as Cultural/Public Use/Open Space Areas. Any of the proposed uses of Zone 3 or 4 lands would allow for protection of water quality either due to less development or use of best management practices to minimize negative impacts. Allocation of other parcels for future developed recreational activities or other public access/use areas would allow TVA control over development to minimize adverse impacts.

Shoreline development on private property, as described under Alternative A, will likely increase under either alternative. Additional Industrial/Commercial, Recreation, and Residential Access (Zones 5, 6, and 7, respectively) have the potential to result in some degree of increased soil erosion due to clearing of woody vegetation and brush, increased runoff of agricultural/lawn chemicals, increased sewage/septic loading, and an increase in currently unknown contaminants if additional point source permits are issued on the reservoir. Negative impacts to water quality associated with these activities include increased turbidity, increased levels of substances toxic to aquatic life, increased bacteriological content, and an increase in nutrient loading which is already occurring in the reservoir.

While water quality impacts resulting from uses of TVA lands would be minimized under either alternative with proper controls, this alternative limits development and ensures that other activities such as developed recreational use, timber harvesting, or other conservation uses would be conducted with protection of natural resources as an objective.

3.8 Aquatic Ecology

3.8.1 Affected Environment

Aquatic habitat in the littoral (near shore) zone is greatly influenced by underwater topography and backlying land use. Underwater topography at Tellico Reservoir

varies from moderately steep, with scattered small bluffs near the river channel, to typically shallower in embayments, coves, and areas further from the river channel and tributary stream channels. Undeveloped shoreline is mostly wooded, so fallen trees and brush provide woody cover in those areas. Woody habitat is usually reduced on TVA and non-TVA lands where backlying property is largely residential or agricultural. The standing timber that was left in the Tellico River arm of the reservoir, and in other isolated areas, provides good woody cover and is unique to TVA reservoirs in the area. The cold water discharges from Chilhowee Dam allow a trout fishery to be maintained in upper reaches of Tellico Reservoir.

As part of the data collection effort for the SMI EIS, a survey was conducted on Tellico Reservoir by TVA to arrive at a shoreline aquatic habitat index (SAHI) score which would indicate the quality of aquatic habitat conditions adjacent to various land uses. Scoring parameters (metrics) included seven physical habitat parameters (i.e., riparian zone condition, amount of canopy cover, bank stability, substrate composition, amount of cover, habitat diversity, and degree of slope) important to Tennessee Valley reservoir resident sport fish populations which rely heavily on shoreline areas for reproductive success, juvenile development, and/or adult feeding. Field methods and the SAHI rationale are described in Appendix G of the SMI EIS (TVA, 1998a). The overall average SAHI score at Tellico was 22.2 (of a possible 35), which indicates generally "fair" shoreline aquatic habitat within the reservoir. Average SAHI scores were higher adjacent to lands currently allocated for Natural/Wildlife Areas (SAHI 27 = "good"), and Cultural/Public Use/Open Space Areas (SAHI 24 = "fair"); SAHI scores adjacent to all other allocated uses averaged 14 or 15 ("poor").

Rock is an important constituent of littoral aquatic habitat over much of the reservoir, either in the form of bedrock outcrops or a mixture of rubble and cobble on steeper shorelines or gravel along shallower shorelines. Substrate and available aquatic habitat in coves and embayments also typically correspond to shoreline topography and vegetation. In recent years, aquatic vegetation has covered about 250 acres–a relatively small amount of the reservoir (TVA, 1998b). In areas characterized by residential development, habitat includes man-made features such as shoreline stabilization structures (e.g., seawalls or riprap) and docks. Fallen trees are less numerous in residential areas.

TVA began a program to systematically monitor the ecological conditions of its reservoirs in 1990. Previously, reservoir studies had been confined to assessments to meet specific needs as they arose. Reservoir (and stream) monitoring programs were combined with TVA's fish tissue and bacteriological studies to form an integrated Vital Signs Monitoring Program. The following descriptions of Tellico Reservoir's existing condition are based primarily on results from this program.

Benthic Community – Benthic macroinvertebrate (e.g., lake bottom-dwelling, readily-visible, aquatic worms, snails, crayfish, and mussels) samples were taken in two areas of Tellico Reservoir in 1994, 1995, 1997, and again in 1999, as part of

TVA's Reservoir Vital Signs Monitoring Program. Areas sampled included the forebay at LTRM 1.0, and a mid-reservoir transition station at LTRM 15.0. Bottom-dwellers are included in aquatic monitoring programs because of their importance to the aquatic food chain, and because they have limited capability of movement, thereby preventing them from avoiding undesirable conditions. Sampling and data analysis were based on seven parameters (eight parameters prior to 1995) that indicate species diversity, abundance of selected species that are indicative of good (and poor) water quality, total abundance of all species except those indicative of poor water quality, and proportion of samples with no organisms present. Collection methods and rating criteria were different prior to 1994, so those results are not compared directly to samples taken using current methods.

As shown in Table 3.8.1-1, the benthic community in Tellico Reservoir rated from poor to very poor in comparison to other run-of-the-river reservoirs. The mid-reservoir transition station rated poor in 1994 and 1995, very poor in 1997, and poor in 1999. Of the seven parameters used to evaluate the benthic community, six received the lowest possible rating at both sites in 1997 (TVA, 1998b). In 1999 only twelve organisms were collected from each site; mostly chironomids and oligochaetes, and a few clams (TVA draft data). Definitive causes of such a poor benthic community are not known, but discharges from Chilhowee Dam are cold, nutrient poor, and have a low mineral content–all conditions that are not conducive to establishing a diverse, abundant aquatic community. Another possible contributor to the very low scores is that the scoring criteria used to evaluate the benthic community in Tellico are the same as for the mainstream Tennessee River reservoirs, which rarely experience low DO levels (TVA, 1998b).

Table 3.8.1-1 Benthic Community Ratings, Vital Signs Monitoring Data

Station	Monitoring Years			
	1994	**1995**	**1997**	**1999**
Forebay	very poor	very poor	very poor	poor
Mid-reservoir	poor	poor	very poor	poor

Fish Community – The Reservoir Vital Signs Monitoring Program included annual fish sampling at Tellico Reservoir from 1990 through 1995 and in 1997 and 1999. The electrofishing and gill netting sampling stations correspond to those described for benthic sampling. Beginning in 1993, the transition zone sampling location was moved to its present location at LTRM 15.0, which is more characteristic of a transition environment rather than the riverine conditions present nearer Chilhowee Dam.

Fish are included in aquatic monitoring programs because they are important to the aquatic food chain and because they have a long life cycle which allows them to reflect conditions over time. Fish are also important to the public for aesthetic, recreational, and commercial reasons. Monitoring results for each sampling station

are analyzed to arrive at a Reservoir Fish Assemblage Index (RFAI) ratings which are based primarily on fish community structure and function. Also considered in the rating is the percentage of the sample represented by omnivores and insectivores, overall number of fish collected, and the occurrence of fish with anomalies such as diseases, lesions, parasites, deformities, etc. (TVA, 1997). A more detailed explanation of the RFAI is included in Appendix C-4.

The vital stations fish community monitoring results are shown in Table 3.8.1-2. These data compare Tellico to other run-of-the-river reservoirs. The station being nearer Chilhowee Dam prior to 1993 may have influenced results from the transition station, but overall results indicate that the Tellico fish community may be improving in recent years. In 1999 sampling, overall species diversity was good, as was the incidence of anomalies. Lower ratings were seen in overall abundance, percent of omnivore and insectivore species in the sample, and dominance of the sample by the most abundant species (TVA draft data).

Table 3.8.1-2 Fish Community Ratings, Vital Signs Monitoring Data

	Monitoring Years							
Station	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1997**	**1999**
Forebay	fair	fair	fair	fair	good	fair	good	good
Mid-reservoir	fair	poor	poor	good	good	fair	good	good

A total of 34 fish species was collected in TVA's most recent fish collections at Tellico in the fall of 1999. More abundant species in the overall sample were gizzard and threadfin shad, spotfin shiner, bluegill, largemouth bass, and brook silverside (TVA draft data).

TWRA creel data indicate that largemouth bass is the species caught in highest numbers, with desirable proportions of quality size fish in the catch. White crappie and bluegill were the second and third most abundant species taken by anglers. TWRA data also reveal that excellent survival to catchable size and relatively slow growth are characteristic of Tellico's largemouth bass population. Average fishing pressure in recent years has declined, probably due to stabilization in fish populations, which is typical after fertility decreases from the levels seen in a new reservoir (TWRA, 1998). The TDEC presently advises that catfish from Tellico Reservoir not be eaten because of PCB contamination.

3.8.2 Environmental Consequences

Impacts to aquatic resources are directly related to changes of the existing natural shoreline conditions. Aquatic resources can be impacted by changes to shoreline (riparian) vegetation, vegetation on backlying lands, and land uses. Shoreline vegetation, particularly trees, provides shade, organic matter (a food source for benthic macroinvertebrates), and shoreline stabilization; and trees provide aquatic habitat (cover) as they fall into the reservoir. Shoreline vegetation and vegetation on

backlying land provide a riparian zone which functions to filter pollutants from surface runoff while stabilizing erodible soils. Therefore, there would likely be some degradation of aquatic habitats associated with continued development along the reservoir shoreline under either alternative.

Shoreline development can alter the physical characteristics of adjacent fish and aquatic invertebrate habitats, which can result in dramatic changes in the quality of the fish community. One of the most detrimental effects of shoreline development is the removal of riparian zone vegetation, particularly trees. Removal of this vegetation can result in loss of fish cover and shade, which elevates surface water temperatures. Also, fish spawning habitat, such as gravel and woody cover, can be rendered unsuitable by excessive siltation and erosion, which can occur when riparian vegetation is cleared (TVA, 1998a). Additionally, shoreline development often results in the removal of existing aquatic habitat (i.e., stumps, brush, logs, boulders, etc.) in association with the construction of water use facilities.

Under some circumstances, construction of docks and piers, while having short-term negative impacts, can increase fish habitat. Fixed docks and piers, especially those with pilings driven into the substrate, provide shade and cover for fish and aquatic invertebrates (White, 1975). Fixed docks, when combined with habitat improvements such as anchored brush, rock aggregations, log cribs, and/or other forms of cover, can actually enhance the shoreline aquatic habitat.

Alternative A – Under this alternative, few tracts of TVA property are designated specifically for protection of sensitive resources, and the extent of protection of natural resources in other designations (such as "Cultural/Public Use/Open Space Areas") would be uncertain. Protection of the natural reservoir shoreline may be undertaken as a secondary consideration on tracts of TVA land designated for various uses including natural resource protection or conservation. Consequently, benefits to aquatic communities may not be a primary consideration when land use decisions are made affecting those tracts. Under this alternative, the quality of aquatic habitats (as evidenced by SAHI scores from SMI data analysis) associated with various land use allocations would likely remain similar to currently existing conditions, which rated "fair" (Table 3.8.2-1). Use of the TVA fee land below the 820-foot contour has been controlled by land rights or rights "implied" from the use of the backlying land. As a result, residential development on TRDA tracts, as well as on private land adjoining TVA shoreland, has resulted in a loss of riparian woody vegetation at some sites where trees on the shoreline have been cleared. In some cases, clearing of trees and brush may have accelerated shoreline erosion, resulting in the placement of seawalls or other shoreline stabilization. Impacts have been less on shorelines lacking woody vegetation (where habitat would have been poor prior to development); in fact, aquatic habitat can actually be improved by placement of riprap or construction of fixed docks on these sites.

Table 3.8.2-1. Allocation of Land in the 1982 Tellico Reservoir Land Use Plan, With Associated SAHI Score (Alternative A)

Land Use Category	Number of Acres	SAHI Score*	% of Total
TVA Dam Reservation	665.9	14	5.3%
Natural/Wildlife Areas	1,912.3	27	15.1%
Cultural/Public Use/Open Areas	7,679.9	24	60.7%
Industrial Development Areas	367.0	14	2.9%
Private Residential Areas	423.6	15	3.4%
Commercial Recreation Areas	41.7	14	.3%
Public Use Recreation Areas	484.9	15	3.8%
State Recreation Areas	901.8	15	7.1%
Eastern Band of the Cherokee Indians Memorial Site	109.6	15	.9%
Highway	56.1	14	.4%
	12,642.8	avg. 22	100.0%

** Good=27-35; fair=17-26; and poor=7-16*

Alternative B – This alternative would provide a better opportunity to protect or enhance aquatic habitats by identifying sensitive resource management or conservation as the identified use on some tracts now having general designations such as Cultural/Public Use/Open Space Areas. Any of the proposed uses of Zone 3 or 4 lands would allow for the protection or enhancement of aquatic habitats by preserving a natural shoreline condition offering a variety of cover types. The extent of woody shoreline cover on such lands as are included in Zones 3 and 4 would be expected to increase in the future as natural succession continues. In Alternative B, 27 parcels (2185 acres) representing 17.3 percent of total acreage, are in the Sensitive Resource Management Zone and 41 additional land parcels (7136 acres) representing 56.4 percent of total acreage are in the Natural Resource Conservation Zone.

Even consumptive activities such as timber harvesting (or other resource manipulation activities on Zone 4 lands) would not adversely impact aquatic resources if properly planned and conducted so that the riparian zone and associated littoral aquatic habitats are protected. The littoral zone is the most productive region of a reservoir. Most important fish species use littoral habitats because of their spawning requirements, the availability of submerged cover (i.e., rocks, logs, brush, etc.), aquatic invertebrates, and small fish as a food source.

Allocation of other parcels for future recreational activities would allow TVA control over developments to minimize adverse impacts. In Alternative B, 33 parcels representing 14 percent of total acreage are allocated to the Recreation Zone. In addition, developed recreation areas allow for the construction of facilities such as fishing piers, artificial fish attractors, or other fish habitat enhancements. Developments such as public parks, recreation areas, and water access sites would

allow access for bank fishing. Some areas may be suitable for the construction of facilities such as fishing piers and the placement of artificial fish attractors or other habitat enhancements.

The SAHI was used to determine any cumulative impacts of shifts in land allocation under Alternative B on the existing and future aquatic habitat quality of Tellico Reservoir. SAHI scores for Alternative A allocation categories that encompass the land use activities planned under Alternative B were utilized to represent changes in land use. Results indicate that reservoir-wide SAHI scores would be essentially unchanged under Alternative B, and still in the "fair" range (Table 3.8.2-2). It is possible that the quality of littoral aquatic habitats will improve in some areas through natural succession and with the protective measures mentioned above, as well as SMP standards for private water use facilities and vegetation management.

Table 3.8.2-2. Summary of Proposed Land Use Allocations With Associated SAHI Score (Alternative B)

Number of Parcels	Proposed Land Allocations	Acres	SAHI Score*
3	2 - Project Operations	635.1	14
27	3 - Sensitive Resource Management	2,184.5	27
41	4 - Natural Resource Conservation	7,136.5	24
8	5 - Industrial/Commercial Development	331.4	14
33	6 - Recreation	1,803.5	15
27	7 - Residential Access	551.8	15
		12,642.8	avg. 22

** Good=27-35; fair=17-26; and poor=7-16*

Four projects that have been conceptually proposed (Eastern Band of the Cherokee Indians Development, Greenway, Coytee Springs Recreation Area, and the Tellico River Corridor) would not significantly alter the quality of adjacent aquatic habitats. Although the Eastern Band of the Cherokee Indians Development is currently allocated Cultural/Public Use/Open areas, which generally exhibited higher SAHI scores, the change to developed recreation would not be as dramatic at this site because of the presence of a small public-use area there now. The Greenway could affect a large area of land and 16.0 miles of shoreline, but the facilities can be designed in such a way that impacts to shoreline vegetation and littoral habitats would be minimal. This would be in keeping with the stated objective to maintain as much of the natural surroundings as possible. Aquatic impacts resulting from this type of development would be less than those associated with recreation developments featuring sports fields, pavilions, and extensive cleared areas. The Coytee Springs Recreation Area would likely result in some degradation of shoreline vegetation associated with more intense public use (i.e., loss of understory brush, dead trees, etc.). However, these impacts could be minimized if the maintenance of

the existing shoreline condition and installation of structure such as brush in the drawdown zone is made an objective during project design. The Tellico River Corridor should better protect aquatic habitats and riparian vegetation by providing guidelines to minimize disturbance of this unique area during the construction of approved water use facilities.

Development of the reservoir shoreline is likely to continue under either alternative. However, Alternative B affords additional protection to aquatic resources near some Zone 7 lands by designating some adjacent shoreline as Zone 4 land, which will allow preservation of a more natural shoreline condition in some restricted areas of residential development. Narrow shoreline strips of TVA land fronting Zone 5 lands can also be maintained in a natural condition since industrial/commercial development seldom requires extensive clearing of shoreline vegetation. Standards implemented in accordance with SMP (TVA, 1998a) will provide improved protection for existing natural shoreline conditions and the unique standing timber aquatic habitat that exists in the Tellico River arm of the reservoir. Some negative impacts to the aquatic environment would occur under either alternative, but such impacts can be rendered insignificant with proper planning, use of protective and mitigative measures during development, and implementation of shoreline categorization. Because aquatic habitat on Tellico can be considered only "fair" overall, impacts to littoral aquatic habitats would be a major consideration in future decisions affecting TVA lands under either alternative. However, Alternative B would likely result in fewer impacts with parcels in Zones 3 and 4 dedicated to protection and conservation.

3.9 Socioeconomics

3.9.1 Affected Environment

The Tellico Reservoir lies in Blount, Loudon, and Monroe Counties in middle east Tennessee, largely within the western part of the Knoxville metropolitan statistical area and well within the Knoxville labor market area.

Population – The 1999 population of the three counties in the Tellico area is estimated by the U. S. Bureau of the Census to be 178,253, a 20.6 percent increase over the 1990 population of 147,758. This growth rate is faster than that of the state, which is estimated to have grown by 12.4 percent, and the nation, which is estimated to have grown by 9.6 percent. Tellico is near much of the fastest-growing parts of the metropolitan area, as growth spreads westward within the area. This is evidenced by the 27.6 percent estimated increase in the population of Loudon County, from 31,255 in 1990 to 39,892 in 1999. In addition, the fastest growing parts of Monroe County have been the west and northwest areas in the general vicinity of Tellico. This general growth pattern is expected to continue.

Recent population growth has exceeded long-term historical rates. TVA considers it likely that this pattern of faster growth may continue in the near future; the local population projections in Table 3.9.1-1 assume a continuation of this faster growth. The major population centers near the reservoir are Knoxville in Knox County and Oak Ridge in Anderson County. Smaller population centers are Maryville and Alcoa in Blount County, Lenoir City and Loudon in Loudon County, and Madisonville and Sweetwater in Monroe County.

Labor Force and Unemployment – In 1999, the civilian labor force of the three-county area was over 91,000, as shown in Table 3.9.1-2. Of those, about 3,500 were unemployed, for an unemployment rate of 3.9 percent. Loudon County had the lowest unemployment in the area at 3.0 percent, with Blount County somewhat higher at 3.7 percent. Monroe County had a higher unemployment rate of 5.3 percent. The unemployment rate for the area as a whole was lower than both the state and national rates.

Table 3.9.1-1 Population and Population Projections, 1980-2010

County	1980	1990	1999	2000	2010
Blount	77,770	85,962	102,785	107,000	128,000
Loudon	28,553	31,255	39,892	42,100	52,800
Monroe	28,700	30,541	35,576	36,800	43,100
Area Total	135,023	147,758	178,253	185,900	223,900
Tennessee	4,591,023	4,877,203	5,483,535	5,657,000	6,165,000
United States (000)	226,542	248,791	272,691	275,306	299,862
Percent Change In Population					
County	**1980-1990**	**1990-1999**	**1990-2000**	**2000-2010**	**1990-2010**
Blount	10.5	19.6	24.5	19.6	48.9
Loudon	9.5	27.6	34.7	25.4	68.9
Monroe	6.4	16.5	20.5	17.1	41.1
Area Total	9.4	20.6	25.8	20.4	51.5
Tennessee	6.2	12.4	16.0	9.0	26.4
United States	9.8	9.6	10.7	8.9	20.5

Source: Historical data from U.S. Bureau of the Census; projections for Tennessee and United States from U.S. Bureau of the Census (United States middle series and Tennessee Series A); county projections by TVA

Table 3.9.1-2 Labor Force Data, Residents of Tellico Area, 1999 Annual Average

County	Civilian Labor Force	Employment	Unemployment	Unemployment Rate
Blount	51,830	49,910	1,920	3.7
Loudon	20,720	20,100	620	3.0
Monroe	18,750	17,760	990	5.3
Area Total	91,300	87,770	3,530	3.9
Tennessee	2,818,800	2,705,300	113,500	4.0
United States	139,368,000	133,488,000	5,880,000	4.2

Source: Tennessee Department of Employment Security; U.S. Bureau of Labor Statistics.

Jobs – The number of jobs in the Tellico area has risen fairly steadily over the past several years. In 1997, the area's total employment, including both proprietors and wage and salary workers, was over 73,000, an increase of 24.9 percent since 1989. Over 58 percent of these jobs were in Blount County. Manufacturing industries accounted for 22.8 percent of the Tellico area's jobs, a slight increase from 22.4 percent in 1989. The number of manufacturing jobs increased during this period in both Blount and Monroe Counties, while declining in Loudon County. The service sector accounted for over 15,000 jobs and 20.5 percent of all employment in 1997, compared to 20.4 percent in 1989.

Occupation Patterns – All the counties in the Tellico area have a lower proportion of their workers in managerial and professional jobs than the state average; an average of 19.1 percent for the area, compared to 22.6 percent statewide. The area also has a lower share of workers in technical, sales, and administrative jobs; 27.8 percent compared to 30.1 percent statewide. Conversely, the area has a higher share of its workers in blue-collar jobs. The shares in Blount County are more similar to the statewide averages, while Monroe County and, to a lesser extent, Loudon County have proportionally fewer white-collar workers and more blue-collar workers.

Income – Per capita personal income in the area increased by 176 percent between 1979 and 1997, about the same as the 177 percent increase experienced by the nation but less than the 204 percent increase in the state. The per capita income of area residents in 1997 was $19,348, 85 percent of the level of the state of Tennessee and 77 percent of the U.S. average. Monroe County's per capita income of $16,187 was the lowest in the Tellico area.

The manufacturing sector currently generates 36.6 percent of the area's earnings by place of work, over twice the national average of 17.7, and well above the state average of 21.7 percent. The Tellico area share, however, is misleading. In Monroe County, 50.8 percent is from manufacturing compared to 34.2 and 30.7 percent, respectively, in Blount and Loudon Counties.